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**STAKEHOLDER ENGAGEMENT IN ECOLOGICAL
RESTORATION
CASE: ABANDONED MINE LAND REHABILITATION**

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Master's Thesis
December 2019

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ABSTRACT

Edward Hingert: Stakeholder engagement in ecological restoration. Case: Abandoned mine land rehabilitation.

Master's Thesis: 82 pages, 2 appendix pages

Master's Programme in Leadership for Change, Sustainable Business Management
December 2019

In this master's thesis, the study focuses on the stakeholder engagement that occurred in a form of ecological restoration namely Abandoned mine lands (AMLs) rehabilitation projects. AML rehabilitation project is a project that involves the assisting of the natural environment in its rejuvenation process. The research aims to comprehend the occurrence of stakeholder engagement and its contribution to the success of AML rehabilitation projects. The research questions include (1) When and how does stakeholder engagement happen in AML rehabilitation initiatives? and (2) What is the contribution of stakeholder engagement to the success of AML rehabilitation projects? The study includes the identification and categorization of stakeholders from featured AML rehabilitation cases, analysis of the stakeholder interests and evaluation of successful AML rehabilitation cases.

The theoretical framework of this study is formulated using stakeholder theory, stakeholder engagement, ecological restoration, and stakeholder value creation. This leads to the utilization of factors including stakeholder interests and stakeholder interactions. Furthermore, the stakeholder engagement of the natural environment is extensively discussed. The study utilizes a qualitative case study and the data is generated using document collection and interviews (phone communication and text-based communication). The data are then analyzed inductively through the use of content analysis methods.

Three propositions derived from these research outcomes are; (1) Stakeholder engagement commences immediately after the site is assessed and chosen for rehabilitation before the detailed planning process. (2) Stakeholder engagement with the natural environment is an extensive and complex process. (3) Successful stakeholder engagement in the AML rehabilitation project allows the transferring of confidence and know-how to the next stage of the project or the further projects.

This master's thesis contributes to the stakeholder and ecological restoration literature by giving a further comprehensive depth on the effects and importance of stakeholder engagement in AML rehabilitation.

In conclusion, the study proposes that various elements of stakeholder engagement have significant influences on the success of AML rehabilitation projects.

Keywords: Stakeholders, Company, Business, Nature, Abandoned Mines, Cooperative engagement, Rehabilitation, Reclamation, Restoration, Qualitative case study

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

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1. Introduction

1.1 Background and motivation

In the past decades, environmental and ecological concerns have become major issues globally. Participation in environmental protection is no longer a matter of goodwill or an optional business strategy for corporations. The advancement in science and the knowledge regarding the importance of environmental protection has led to businesses and corporations becoming more involved with the protection of their natural assets. Recognition of the importance of the natural environment is essential for any business. (Hawken, 1997).

Environmental problems are problems that concern more than one party and require collective efforts. Ecological restoration is the aiding and assistance given to the recuperation process of the fractured ecosystem (SER, 2004, p. 3). In ecological restorations, there are many actors such as land users, local and state governments, businesses and residents who are the stakeholder. Moreover, most of these stakeholders play important parts in the process of restorations (Everingham, Rolfe, Lechner, Kinnear & Akbar, 2018, pp. 398–400).

Ecological restoration is a comparatively new school in environmental conservation, especially the abandoned mine land restoration. According to Worrall, Neil, Brereton & Mulligan (2009, p. 1433), an important component in the ecological restoration process is the supportive government body, formed through a process involving various levels of stakeholder. Thus, the process of ecological restoration can be seen as a set of linked activities, undertaken by various stakeholders. According to Freeman (1984, p. 46), a stakeholder is a group or person who can influence or is influenced by the organization's goals. The involvement of the stakeholders is an integral factor in the success and failures of the restoration efforts. Often, stakeholders are comprised of parties with different values and interests.

In recent years, more pressures have been imposed on the mine operators regarding their sustainability management and business choices (Houdet, Trommsetter & Weber

et al., 2011). However, the operators alone may not have enough resources nor motivation to undertake an entire restoration process. Even if the operators could undertake the entire enterprise by themselves, the involvement of other stakeholders are unavoidable as the process of restoration may impact more than just the operators.

Since the involvement of stakeholders is crucial and various stakeholders bear different values and interests, the alignment of these values and interests becomes the main reason for their interactions. Stakeholder engagement can be defined as the involvement of stakeholders that either influence or are influenced by the objectives of the organization (Sloan, 2009). Thus, the key to the understanding of the links between stakeholders and their corresponding involvement in ecological restorations may lie in the understanding of the value and interests that stakeholders share. The negative effects of disturbed ecosystems go beyond the occupation of a vast piece of land which otherwise could be put to better use. As disturbed ecosystems affect more parties than just the land user, the involvement of many stakeholders becomes a necessity.

1.2 Research aim and questions

The research aims to analyze and understand the process of stakeholder engagement in the context of ecological restoration initiatives. In this study, the specific form of ecological restoration examined will be the restoration of abandoned mine land (AML). Abandoned mine land or AML is a land that has been defiled or contaminated by humans through actions such as explorations and extractions and therefore is unsuited to be put into use without significant rehabilitation (Zhang et al., 2016). It is important to clarify that in this thesis, the term Ecological restoration would be used as a broad term, however, the main focus of the study will be the AML restoration. Moreover, the term *AML restoration*, *AML rehabilitation*, *AML reclamation*, and *AML reparation* will be used interchangeably throughout the study.

The main questions of the study are:

1. When and how does stakeholder engagement happen in AML rehabilitation initiatives?
2. What is the contribution of stakeholder engagement to the success of AML rehabilitation projects?

Under Freeman's (1984) characterization, the identification of stakeholders is mandatory. Following the derived context, the identification and classification are based on the analysis of the cases of AML restoration. In addition to the identification of stakeholders, the stakes they hold will be relevant in understanding the magnitude of the impact their involvements impose. Moreover, the knowledge of the effects that AML has on the stakeholder could help identify the interests of the stakeholders. To explain the stakeholder engagement process in AML restoration, an examination of stakeholders' diverse roles and their contributions to the AML rehabilitation will prove beneficial for the research.

This master's thesis aims to raise the understanding of stakeholder engagement in the context where diverse stakeholder values and interests are involved. Furthermore, the research will provide an extended and specific perspective of ecological restoration from the AML restoration standpoints.

1.3 Structure of the thesis

Figure 1 shows the structure of the thesis:

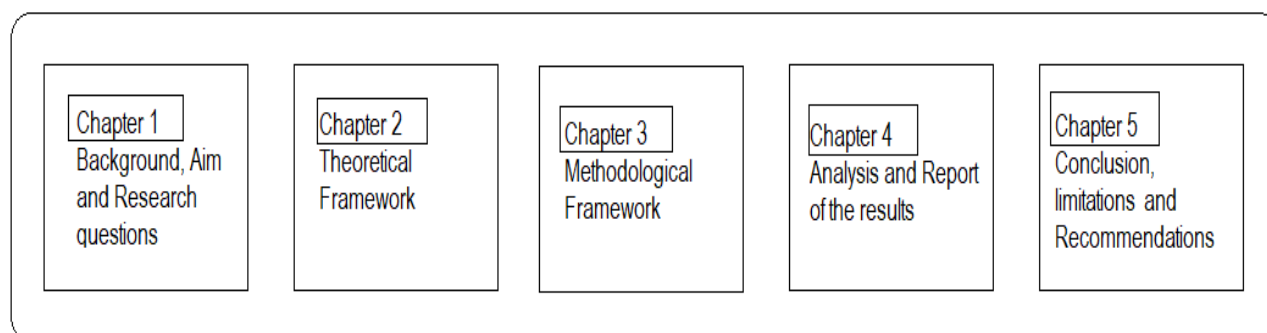


Figure 1. Research Structure

The first chapter provides the context and an introduction to the topic of ecological restoration together with the research scope and aims. It comprises the background, motivation and research questions.

The second chapter presents the previous literature along with the theoretical framework for the study. It further focuses on the various theoretical background, which the analysis of this research is built upon. The third chapter outlines the methodological choice regarding data collection and analysis. This chapter reports on the steps and process of data collection and analysis.

The fourth chapter presents the findings of Abandoned Mine Land (AML) restoration cases which resulted from the analysis in the research work. In the final section, the outcomes of the study are discussed. Furthermore, the conclusion and recommendation are drawn from the findings.

2. Theoretical framework

2.1 Stakeholder theory

The publication of Freeman's influential work, '*Strategic Management: A stakeholder approach*' (1984) has led the stakeholder theory to become widely used in many modern pieces of research. Although in his work (1984), he mainly focused on the group of stakeholders of a corporation, his theory suggests that value should be created to all stakeholders in the organization.

The theory has become the foundation of many expansion and reiterations. Complimenting the traditional stakeholder theory (Freeman, 1984), many additional focuses and the expansion of scopes which include social spheres, external factors, and several alternative perspectives were done later on (Post, Preston & Sachs, 2002; Sachs & Rühli, 2011).

Despite the original focus, the flexibility of the stakeholder theory does not discriminate the fields of relevance upon which the theory can be applied and adapted. Freeman's (1984) theory seeks effective management of the organization in the face of changes and volatility through the inclusion of external actors. However, Mitchell, Agle & Wood (1997) suggested that not all stakeholders bear the same relevance to the organization.

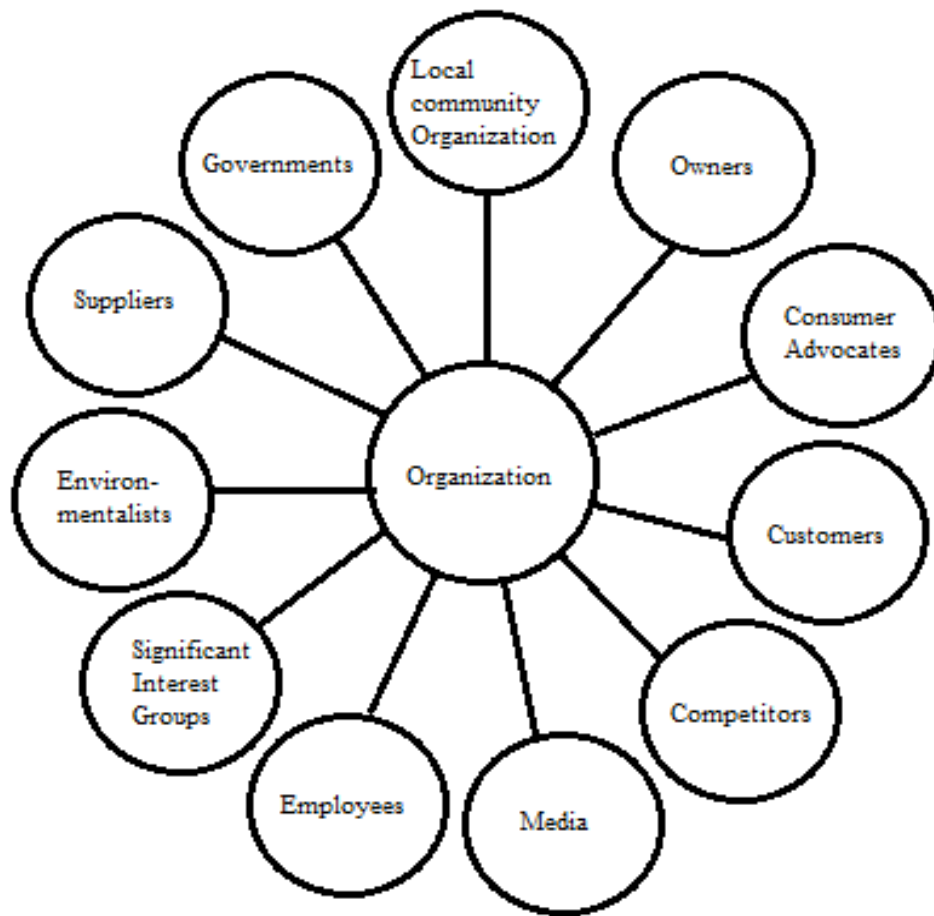


Figure 2. Stakeholder view of the firm (Freeman, 1984, p. 25)

Figure 2 represents Freeman's (1984) characterization of the linking structures between stakeholders and organization. The figure includes the potential parties that are stakeholders, which may differ under a case-by-case basis. The diagram demonstrates the connection between stakeholders and the organization. The traditional 'input and output' model explains that the investors, suppliers, and employees inject their inputs into the firm which in turn resulting in the outputs for the customers. The stakeholder model, however, proposes that instead of one-way relationship, the firms or organization and other parties are in fact in two ways inter-relationship.

In response to the diversity in how scholars implement stakeholder theory and model, Donaldson and Preston (1995) categorized the approaches towards stakeholder theory into three aspects as follows: the 'descriptive', 'instrumental' and 'normative' aspects.

The descriptive approach explains the behaviors and corporate characteristics where stakeholder theory is applied, concerning the operations of the organization. The instrumental approach essentially allows stakeholder theory to be applied in more objectives and performance-focused fashions. The aim is to identify the links between the stakeholder activities and the success of organizational goals. Finally, the normative approach puts the function of the organization in parallel to moral and philosophical values. Under the normative approach, all stakeholders' interest has intrinsic value (Donaldson & Preston, 1995, p. 74). Although the three approaches view the stakeholder theory and its applications from different perspectives, yet the three aspects nest within each other with the normative aspect being the central core (Donaldson & Preston, 1995, p. 74).

The Stakeholder theory was later expanded by Post et al. (2002) into additional arenas. As shown in Figure 3, the extension adds the three layers, which are resource base, industry base, and socio-political arena. In other words, the stakeholder view is not constricted solely to the contexts of the corporation. The three layers represent the characterization of the diverse roles of stakeholders towards the organization. Thus, making the organization as the focal party with mutual connectivity with the stakeholders.

Besides, post et al.'s (2002) new view on stakeholder theory emphasizes the importance of stakeholder networks and their mutual interactions. This characterization gave more depth to the range at which the stakeholder theory is applicable in both practical instances and theoretical aspects. It was earlier mentioned by Windsor (1992) of the differences between the narrow view and the broad view of what stakeholder is. Broad view characterizes the stakeholder similarly to the contemporary theory as group or individuals affected, affected or have a valid interest in the outcomes. (Freeman, 1984; Donaldson & Preston, 1995; Sachs & Rühli, 2011; Freeman et al., 2018) The narrow view, however, focuses on the integral parties upon which the organization relies.

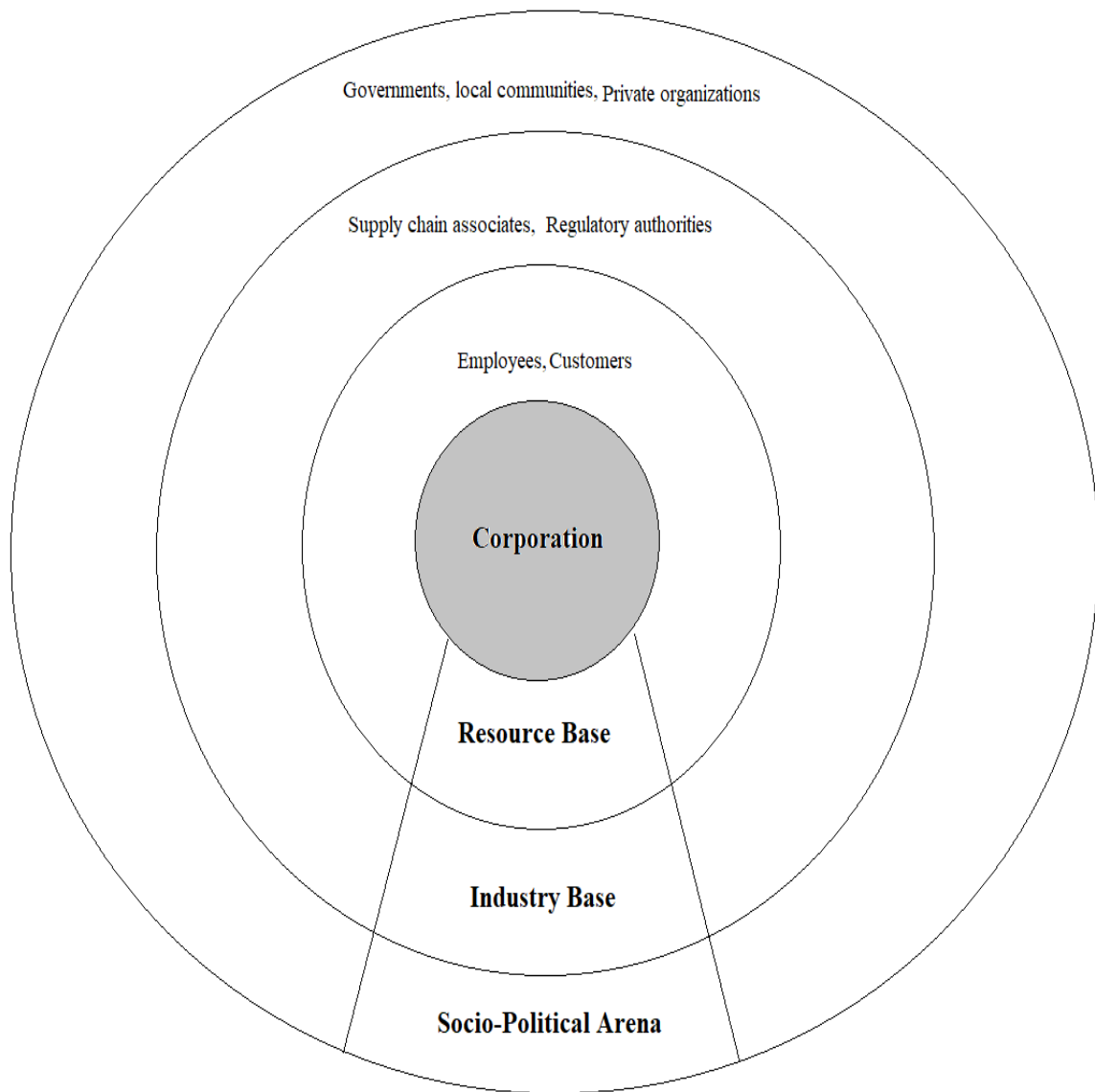


Figure 3. The stakeholder view of Corporation

Figure 3 illustrates the connectivity of the stakeholders and the organization in addition to the grouping of different stakeholders in different layers. Jensen (2001, p. 246) suggested that a firm cannot maximize value if it ignores the stakeholders' interests or "mistreat any important constituency". This further acknowledges the interconnecting relationship, which forms a network with the effort to create value. Despite the positive connotation of stakeholders' relationship with the firm, Post et al. (2012, p. 9) also pointed out that actors such as competitors are also qualified as stakeholders. Besides

rivalry in obtaining the market shares, the organizations in the same arena or industry undoubtedly share the interest of maintaining the flourishing of the industry. In other words, stakeholders do not necessarily require seeing eye to eye in every aspect of the organization.

The resource base includes stakeholders who are responsible for the organizational aspects of risk and cost bearing as well as other managerial aspects. The characterization of the resource base groups separates the stakeholders under the attributes of ownership, recruitment and training and downstream distributions. Ownership concerns the aspect of capital sources and risk management of the organization. Stakeholders such as shareholders, investors and so on fall into this category. Recruitment and training emphasize the collaborative aspects and human capital attributes. The downstream distribution aspect is directly related to the stakeholder outside the organization i.e. customers/users (Post et al., 2002, p.11).

Actors such as supply chain associates, joint partners, authorities and unions are placed in the stakeholder group of industry structure. The group's target focus is on the aspects of operational level management such as information flows, financial links, networking, interactions with external authorities and unions. The stakeholder group carries the responsibility of maintaining the efficiency and operational balance between the organizational need in close juxtaposition with the compliances demanded by regulatory authorities (Post et al., 2002, p. 11).

The socio-political arena consists of aspects in which the stakeholders are given the roles of operating and threading in the face of multiple constituencies and jurisdictions. The company-wide recognition of the integrity of involving parties eases the ability to reach the goals within the societal jurisdiction that the organization exists in (Post et al., 2002, p. 21). The stakeholder roles in the socio-political arena of the extended enterprise bear the burden of generating possibilities for adaptive integration and/or conflict with actors such as governments, communities and private organizations. The model suggests that the relationships with these stakeholders could have effects on reputations or inter-jurisdictional accessibility of the organization. (Post et al., 2002, p. 11).

However, despite the characterization and the elaborated expansion of the model, Post et al.'s (2002) conceptualization of stakeholder roles strictly perceives corporation as the nodal point. Nevertheless, this extended perception of stakeholder theory paves the way for the adaptation of stakeholder theory into other contexts. Harrison and Thompson (2014) suggested that, as society becomes further advanced (technologically or otherwise), so is the importance of the inclusiveness of diverse stakeholders.

2.2 Stakeholder engagement

According to Sloan's (2009, p. 26) characterization of stakeholder engagement, the involvement is subjected to the stakeholders with close ties to the organization. These stakeholders include shareholders, workers, consumers, suppliers, and including ones that may be more distant to the organization such as locals, various external agencies and concerned parties (Sloan, 2009, p. 26). According to Jeffery (2009, p. 12), the seven core values of stakeholder relationship are summarized as follows:

1. The decisions of the stakeholders should matter when the subject of concern could potentially impact their lives or livelihoods.
2. Valid stakeholder involvement should assure that their concerns and contribution will affect the decisions.
3. Stakeholder engagement allows the free flow of relevant information and thus, further leads to the exchange of interests, needs, and concerns between all stakeholders.
4. The involvement of stakeholders accommodates the participation of not only interested stakeholders but also the potential stakeholders.
5. Stakeholder participation actively welcomes contributions to designing how the involvement is achieved.
6. Stakeholder interaction allows the participants to obtain relevant information that is important to the decision-making process.
7. Their involvement should reveal the effect their contribution had once the decision is made.

The key attributes that the mentioned seven-core values share are the importance of interactions and cooperation between the participants. Onkila (2011) claimed that stakeholder interactions are one of the crucial solutions to help push the environmental agenda in organizations. Consistent participation and the willingness to cooperate are important (Onkila 2011; Russier 2018). However, the participant's knowledge of 'why an organization is doing things and what value is being created' is equally crucial (Jeffery, 2009, p. 42). Sloan's (2009, p. 32) findings from 'Project Response' (a research project on corporate social responsibility) suggest that one of the issues of the complex set of relationships on the alignment between stakeholders that has become of increasing practical importance is the stakeholder engagement.

Sloan (2009) categorizes the stakeholder engagement approaches into two levels. The level of control and the level of collaboration. The former approach involves the implementation of strategical actions in juxtaposition to organizational stakeholder engagement. This approach allows the evaluation of the extent to which stakeholder interests and agendas can affect the organizational overall directions. The latter approach exploits the relationship-based characteristics of stakeholder engagement by forming strategic directions of the organization with the collaboration of stakeholders.

Stakeholder engagement plays a major role in knowledge sharing. MacDonald (2018) pointed out that there are places for the involvement of all parties regardless of their time, expertise and availability. More importantly, the interactions between stakeholders, even the most basic ones are essentially relevant in the perspective of stakeholder engagement (Pacheco & Garcia, 2012).

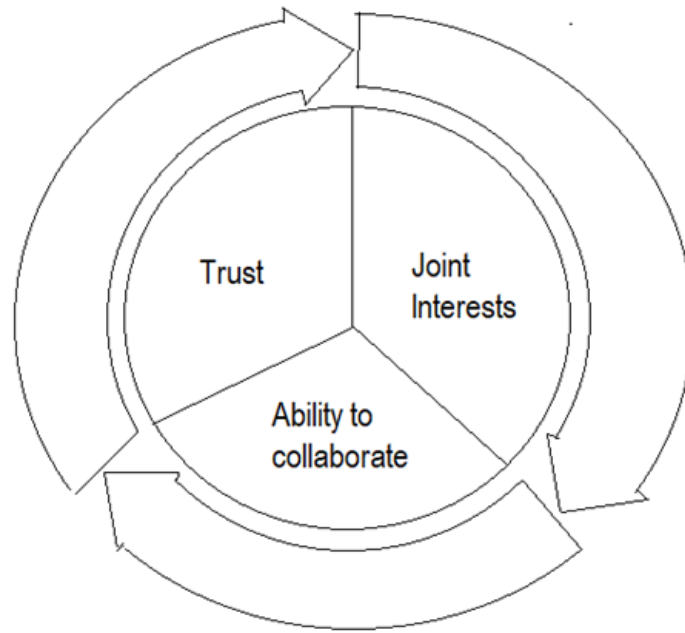
2.3 Stakeholder value creation

Mitchell et al.'s salience model and stakeholder attribute theory (1997) is an effective tool for stakeholder identifications. However, the attributes presented, which are power, legitimacy, and urgency, put fundamental emphasis on the influential aspects of stakeholders. Under this model, the stakeholders are constantly in a stagnating competition, struggling to expand their territory of salience through acquiring more

attributes. The traditional input-output model places the crucial aspects of the organization on the transactional and logistical relationships. However, stakeholder theory thrives on the mutual interaction between stakeholders and organizations as they reinforce each other towards common values. Therefore, despite the conflicts of influence between stakeholders, they strive yet to create value for the organization. Kujala, Lehtimäki & Myllykangas (2012) elaborated on the point that the interactions which create values could come in any form of interaction i.e. communication, transactional and so on.

Hörisch, Freeman, and Schaltegger (2014) pointed out that organizations should not place the interests of different stakeholders as dichotomies. For example, ethical values and economic benefits in a company should not be mutually exclusive. Freeman (2010) described a similar phenomenon as a trap in the theory where stakeholder interests are seemingly treated as opportunity costs. A similar notion was expressed by Clarkson (1995), although the statement strictly limits the value creation to the primary stakeholders. Others argue that an organization creates value for stakeholders throughout the spectrums of involvement (Post et al., 2002; Harrison et al., 2010). Furthermore, organization value is not limited to economic or monetary benefits; instead, organization values can be in the forms of societal value, well-being, environmental protection and so on.

With that in mind, unlike the stakeholder salience model, which is conflict-oriented, the model of Stakeholder Value Creation (SVC) proposes a more harmonic alternative. SVC model (Kujala, Lehtimäki & Freeman, 2019, p. 131) seeks to understand the characteristics and value-creating stakeholder relationships rather than identifying each stakeholder's interest. In other words, the model advocates the achievement of organizational values cooperatively rather than competitively.



Stakeholder value creation model (Kujala, Lehtimäki & Freeman, 2019)

Figure 4. Stakeholder value creation (SVC) model (Kujala et al., 2019, p.132)

Figure 4 illustrates the intertwining relationships of the three attributes of stakeholder value creation. The three attributes suggested in the SVC model are joint interests, ability to collaborate and trust (Kujala et al., 2019, p. 131).

Joint interests comprise of shared objectives and strategic goals regardless of the roles of stakeholders. This attribute embodies the sense of mutual understandings and motivation to seek collective efforts. Furthermore, the attribute becomes stronger when stakeholders move from short-term strategic goals to long-term strategic objectives (Kujala et al., 2019, p. 132).

The ability to collaborate involves understanding and interacting between stakeholders as well as information sharing. An important aspect that stimulates stakeholders' 'ability to collaborate' stems from the knowledge that they could advance their agendas as well as their joint interests through collaboration. In addition to willingness, the attribute inserts the aspect of commitment into the stakeholder engagement. (Kujala et al., 2019, pp. 133–134)

Trust is the attribute built upon the outcome of successful interactions. Although trust is the factor between stakeholders that requires earning, however, once it is earned, it encourages further and stronger bonds. Moreover, the higher the trust is between stakeholders and organization, the higher the likelihood becomes for the engagement to be further transparent. (Kujala et al., 2019, p. 134). In other words, trust is the attribute of value creation that stakeholder engagement strives to achieve. Once trust is formed, the attribute becomes the factor that initiates further stakeholder relationships and value creations.

Under the stakeholder salience model, stakeholders work to maintain their attributes and expand their salience within the organization. Similarly, in the stakeholder value creation (SVC) model, stakeholders also work to maintain the attributes while strengthening them further. Freeman, Harrison & Zyglidopoulos (2018) express their support on the cooperative aspect of stakeholder engagement by stating the importance of reciprocity even among different levels (Clarkson, 1995) of stakeholders. However, the latter model focuses on the cooperative aspects and encourages stakeholders to advance their interests collectively.

2.4 Natural environment as a stakeholder

Freeman's (1984) characterization of stakeholders segregates the scholars' views between ones that include human aspects as a pre-requisite for being a stakeholder and the view that does not uphold this pre-requisite. Thus, the topic of the natural environment as a stakeholder has become a widely debated topic. Although the topic was widely discussed and disagreed among scholars in the past decades, the recent literature revealed otherwise. This could only mean that the scholars had either settled the debate or had moved past the surface level concern which is the status of the natural environment and agreed upon the importance of the natural environment in businesses.

In this study, the research is approached through the perspective where the natural environment is regarded as a stakeholder. Whenever the topic of the natural environment and stakeholder theory are mentioned together, the most essential

elements circle back to the identification of stakeholders. There are several tools and frameworks for the purpose and the results vary (Savage et al., 1991; Mitchell et al., 1997; Neville et al., 2011; Post et al., 2002). However, in this study, stakeholder identification is carried out according to the role of the actors towards the organizational goal.

Gauthier (2018) argues that new value creation opportunities with the natural environment can be achieved through the integration of sustainability research and stakeholder theory. Although Gauthier's claim mainly presented the point on the logic of instrumental stakeholder theory, the underlying notion applies to the other variance of stakeholder theory. Gauthier (2018, p. 28) further argued that, since corporations are in one way or another, affected by the condition of the natural environment, the recognition of the natural environment as a stakeholder can help unveil marginal competitive advantage.

In other words, organizations can bring about major impacts by interacting or encouraging stakeholders to interact with the natural environment. Therefore, it is only logical to legitimize the stakeholder status of the natural environment under the value creation perspective.

In addition to Gauthier's more strategic approach, there is also other more philosophical and sustainability-oriented logic on considering the natural environment as a stakeholder. Willard, B. (2019), one of the ISSO certified sustainability professionals and the author of the book 'The Sustainability Advantage' justified his stance through the arguments based on the logic of interdependency between natural environment and economics. The interdependency was explained through the analogy of businesses being the subsidiary of the natural environment and therefore are nested variances. Furthermore, Hoffman & Georg (2018) mentioned that debate on the Anthropocene expressing human activity and the transformation of the natural environment the human activity brings. This demonstrates that the natural environment is always the primary contender to affect or to be affected by organizational objectives.

2.5 Ecological restoration

Ecological restoration is a science that seeks to restore ecological integrity in a degraded natural environment (Mansourian, 2016). Ecological restoration becomes a necessity for the damaged natural environment due to its inability to provide and support biodiversity optimally (Syme & Rusche, 2018). In addition to the resilience of the natural environment, the assistance in rehabilitation or restoration is the most consistent approach in aiding the natural process (Nunes, 2018).

The process of restoration is by no mean a simple task. Ecological restoration is a lengthy and delicate process that requires the investment of many kinds of resources. According to Higgs (2003), the objective of ecological restoration is to improve the states of the destroyed ecosystem as well as to return it to the states it was in previously. This characterization of the goal of ecological restoration essentially raises the question of what is the previous state of the ecosystem that is being restored.

Ecological restoration is achieved not through direct intervention for designated outcomes, instead, it requires the manipulation and conditioning of the ecosystem's biophysical attributes. These processes further aid the living organisms in doing their work. (Clewell & Aronson, 2013, p 3)

Ecological restoration is a broad term and this is due to the abundance in types of restoration. Admittedly, it is impossible to restore an ecosystem to its original state because of the constant shifts and fluxes of the natural environment even without the involvement of humans. Therefore, ecological restoration often sets the goal to restore the ecosystem to the point before human intervention and exploitation. Even then, due to factors such as climate, invasion of species and land/water alterations, some ecosystems have been rendered irreversible (Perring & Ellis, 2013).

Unfortunately, environmental threats and crises are not visible to immediate perceptions. Even with the advancement of technology and superior knowledge of scientists, beliefs and the perceptions of environmental crises vary among the common

denizens. As Clayton and Myers (2015) stated, for example, incidents such as oil spills or nuclear accidents capture the attention of the mass. However, they also firmly pointed out that, on the contrary, more subtle threats such as gradual temperature changes usually tend to go unnoticed. Ecological restoration is one of the means to help calm these subtle yet adverse effects and this is one of the values of the restoration.

The Society of Ecological Restoration (SER) has issued the fifty-one steps guidelines for restoration encompassing the project from its initial conception to preparation of final reports (Clewell & Aronson, 2013, p 170). Clewell & Aronson (2013) categorized the fifty-one step guidelines into six groups. The six groups of SER guidelines cover phases such as planning, preparation, pre-implementation, implementation, post-implementation, evaluation and raising public attention (Clewell & Aronson, 2013). The complete 51 steps under the mentioned six groups are presented in Table 1.

Table 1. SER's 51 steps guidelines for ecological restoration under its designated groups (Clewett & Aronson, 2013)

SER guidelines groups	51 steps guidelines
Planning during the conceptual state.	<ol style="list-style-type: none"> 1. Identification of project location and perimeter. 2. Identification of ownership. 3. Identification of the need for rehabilitation or restoration. 4. Identification of the type of ecosystem. 5. Identification of objectives. 6. Identification of project site conditions subjected to reparation. 7. Identification of factors needed to be regulated and reinitiated. 8. Identification and checking different types of biotic intervention. 9. Identification of geological restrictions. 10. Identification of the project's sources of funding. 11. Identification of required equipment and workforce. 12. Identification of required biotic resource. 13. Identification of preliminary permits from government organizations and agencies. 14. Identification of permits and other legal contents. 15. Identification of the project time-frame. 16. Identification of tactics for long-term maintenance.
Tasks (Pre-implementation)	<ol style="list-style-type: none"> 17. Appoint a technical expert. 18. Set up the working team. 19. Arrange a budget to fund the preliminary assignments. 20. Keep a record of the existing state of site ecology. 21. Keep a record of the historical causal factors that led to the damages. 22. Undertake preliminary evaluation. 23. Establish a model ecosystem to refer to. 24. Collect relevant information for key species. 25. Investigate and evaluate the effectiveness of the restoration methods. 26. Assess the feasibility of the goal of the project. 27. Make a list of aims that are supplementary to the goal of the project. 28. Secure official permissions from regulating authorities. 29. Establish platforms for public parties and stakeholders. 30. Collaborate with stakeholders to raise more attention. 31. Establish a platform for public involvement in planning and achieving cultural insights. 32. Set in place the necessary infrastructure to carry out the project. 33. Inform and train the party responsible for the supervision of the project.
Planning of implementing strategies	<ol style="list-style-type: none"> 34. Describe the interventions that will be implemented to attain each objective. 35. Acknowledge the role of passive restoration. 36. Prepare performance standards and monitoring protocols to measure the attainment of each objective. 37. Schedule the tasks needed to fulfill each objective. 38. Obtain equipment, supplies, and biotic resources. 39. Prepare a budget for implementation tasks, maintenance events, and contingencies.
Tasks (During implementation)	<ol style="list-style-type: none"> 40. Set working areas. 41. Set up monitoring equipment. 42. Execute restoration.
Tasks (Post-implementation)	<ol style="list-style-type: none"> 43. Install measures against vandals and obstructive animals. 44. Do maintenance. 45. Re-evaluate the project site to identify any need for midway adjustments. 46. Monitor and record the relevant standards. 47. Adopt adaptive management measures.
Assessment and publicity	<ol style="list-style-type: none"> 48. Review the monitoring data to evaluate the standards and see if the project goals are met. 49. Carry out the ecological assessment. 50. Evaluate the cultural aspect of the project. 51. Publicity and report the completed project.

Conceptual planning commences with the steps where the ecosystem that is under consideration for restoration is identified along with the causes of impairments. Once the justification is made, the expected outcome of the restoration is envisioned. The next step is to identify the stakeholder part of stakeholder engagement to seek their collaboration if needs be during the restoration process. Further goals are adjusted based on cases. The following step is to plan the tactics (non-specific) that are suitable for the ecological drivers of that particular ecosystem as well as evaluating if the identified ecological driver is self-sustaining. The next step concerns the potential hindrance of restoration and finally the sourcing of funding, labor, and miscellaneous resources as well as the estimation of the project period (Clewell & Aronson, 2013, p. 171).

Preliminary tasks are comprised of administrative works such as preparation of the budget and so on, conducting ecological inventory and photo documentation of the project. The ecological inventory comprises of information regarding various aspects of the physical environment, which decides the extent of restoration along with the methods. Once the documentation is assessed, the goals are adjusted if needed. For larger restoration projects, short-term objectives are set to generate proof of successful completion accordingly. (Clewell & Aronson, 2013, pp. 172–173).

Implementation planning starts with the preparation of project plans which shows the works that need to be completed with the means to complete them. Once the plans are finalized, the process of training and securing of equipment commence. (Clewell & Aronson, 2013, p. 174)

Implementation tasks consist of the steps, which materialized the plans along with some additional supplementary tasks (fence installation etc.). Post-implementation tasks mainly focus on the ‘aftercare’ or the process of maintaining and managing the installed plans. Evaluation and publicity are the final steps where the data are evaluated for final reports before announcing the completing of the project to the public to reinforce publicity and favorable public attitude towards the projects (Clewell & Aronson, 2013, pp. 174–177).

The more important question than how the ecological restoration process is carried out and regulated is the question of what are the values in doing so. Bowers (2016), the

founder of Biohabitats and a patron of ecological restoration for over three decades expressed his view that the vision of ecological restoration practices relies on the knowledge of the past to restore the future. Clewell & Aronson (2013) presented that the values behind the advocacy of ecological restoration can be classified into four groups. They are personal values, ecological values, cultural values, and socioeconomic values.

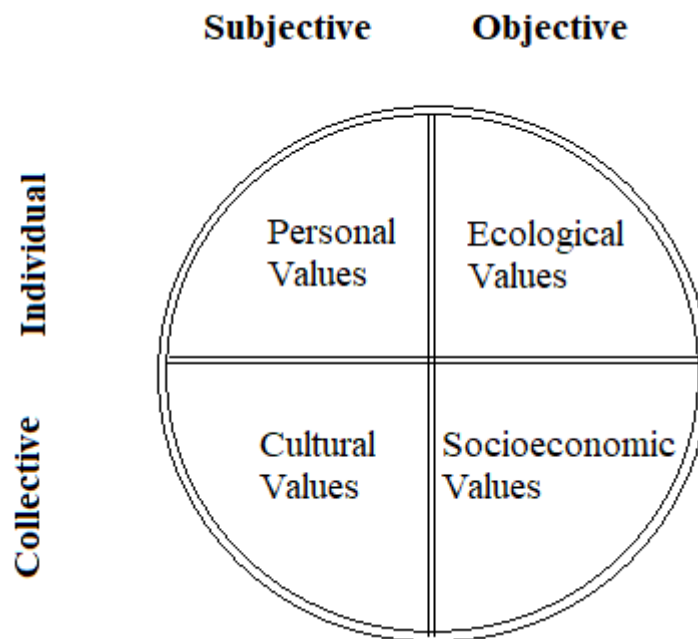


Figure 5. Four-quadrant model for ecological restoration (Clewell & Aronson, 2013, p. 16)

Figure 5 illustrates the array of values and their groups in quadrants. Since ecological restoration is a practice that requires interaction and cooperation from many parties, the participants are most likely to see different values in the practice. Some values are of subjectivity and emotion while some are of objectivity and pragmatism (Clewell & Aronson, 2013, p. 16)

Ecological restoration requires a proactive choice of actions that involves understanding and interaction with the natural environment. Technological resources are mere tools and the task of nurturing is people's responsibilities and direct participation. A restoration is an act of re-establishing a sense of place and worth. (Bowers, 2016.)

Clewell & Aronson (2013, p. 17) explained that 'personal values' represent the effects that ecological impairment has to our emotion which could lead to outrage and anger that such impairment is allowed to happen. The partaking (as any roles) in ecological restoration enterprises may be our responses to the mentioned emotional state. 'Ecological values' represent our rational response based on the knowledge and understanding of the natural environment. This often leads to an attempt to restore the lost attributes and values of impaired ecosystems (Clewell & Aronson, 2013, p. 17).

The socioeconomic values take into consideration, the potential risks of ecosystem impairment on collective socioeconomic values such as well-being, the standard of living, social integration, economic distress and so on. Finally, the cultural values quadrant represents the notion of a certain loss of culturally meaningful commodity due to ecosystem impairment. Clewell & Aronson (2013, p.17) gave an example of iconic sites such as public-parks and sacred sites that maintain the adherence of bonds between local communities and social bonds.

Although the participation in the ecological restoration stems from different values, interests, and motivations, however, when the restoration is successfully undertaken the pragmatic and objective goals are always achieved.

2.6 Summary and synthesis of the theoretical framework

In summary, ecological restoration involves the stakeholders to perform their designated roles. These roles are diverse among different stakeholders depending on the level of influence and stakes they possess. Essentially, the stakeholders exercise their roles through communication on the interest of the projects. Communication is the invaluable contribution that is integral to ecological restoration. However, communication may come in different forms. The stakeholder role of the natural environment often is expressed in the form of responses to the actions of the other stakeholders who undertake the restoration.

One crucial and foremost step for stakeholder relationship development is identification. There are many frameworks designed for the process. The criterion ranges from interests, influence, strategical and even relationship-based. Understanding the

interests of the stakeholder is vital to ensure the success of the organization. However, more importantly, the comprehension of how different stakeholders perceive value is an invaluable asset. Sloan (2009) pointed out the shift in the approach of stakeholder engagement from the traditional control orientation to collaboration orientation. This is supported by Jefferey (2009) seven core values of stakeholder relationship, which emphasizes the participation of stakeholders.

In the context of ecological restoration, stakeholders are vital parts of the enterprises. Moreover, stakeholder identification is one of the most important tasks in ecological restoration projects as eluded in SER's ecological restoration guidelines (Clewell & Aronson, 2013). In other words, the restoration enterprises are dependent on the stakeholders. Therefore, understanding the values that stakeholders seek to create as well as the interests they seek to advance is the key to identify how stakeholder engagement happens in ecological restorations. Despite the inability to communicate through normal means, the natural environment as a stakeholder exercises its power even before the restoration enterprise is finalized. For example, the ecological state of the sites is often the main factor used to decide the priority of the projects (Clewell & Aronson, 2013).

Researches on ecological restoration more often than not include the context of stakeholder participation and their importance to the success of restoration enterprises. However, only a small number of them took the social scientific approach and perceived the topic from the primary lens of the stakeholder theory. Furthermore, among the researches in ecological restoration, abandoned mine land (AML) restoration lacks the attention in contrast to other restorations. In this study, the main focus will be on how stakeholder engagement that leads to successful AML restoration happens. Furthermore, the study seeks to view the stakeholder engagement from the perspective of value creation. Figure 6 shows and framework in which the empirical study of this research will follow.

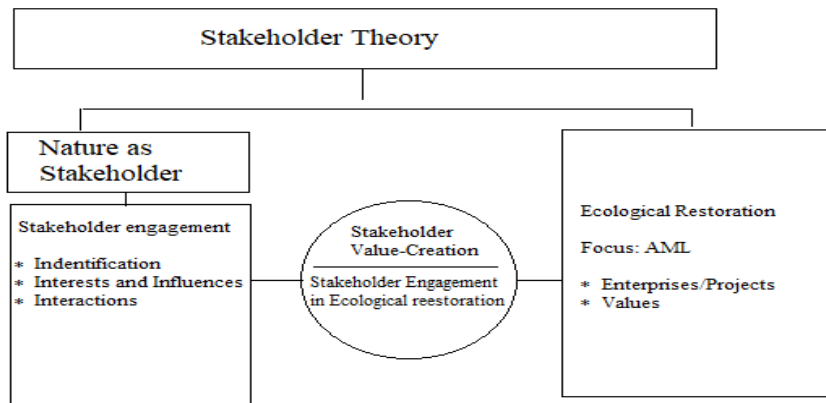


Figure 6. Research framework

3. Methodology

3.1 Research Contexts

Firstly, it is important to address the rationale behind the choices of the cases featured in this study. This rationale consists of the aspects and factors that the researcher deemed as important and reflective towards the research. All the featured cases possess some key differences and similarities and they were chosen particularly for those attributes.

The first and most basic attribute that is considered for these cases is the sizes of the sites upon where the enterprises took place. The sizes of all the featured project sites are significantly different. For example, the restoration site of the Black Diamond mines in Western Australia is a pit lake of approximately 0.75-kilometer-long, while the Rooikraal Tailing facility site is 100ha (0.01 square kilometer). The main OU (operation unit) out of three from Bunker Hill mining and metallurgical complex houses a whopping 21 square miles (54.39 square kilometers).

The second attribute is the location of each of these enterprises. Since only three AML restoration projects were included in the study, the decision was made to choose cases from diverse regions. Projects from different regions contained stakeholders from different backgrounds, cultures, values, needs and even legal regulatory jurisdiction. Therefore, it is believed that having diverse cases helps immensely in analyzing the nature of the involved stakeholders.

The three chosen projects are from North America, Western Australia, and South Africa. Since content analysis seeks the patterns of a phenomenon which it attempts to explain, using all the cases from regions that share values and jurisdiction may skew the result. Instead of identifying the pattern of how stakeholder engagement happens in AML restoration enterprises, the result may skew towards the pattern of how stakeholders of certain legal jurisdiction and region engage in AML restoration enterprises. This further allows the study to perceive the difference in the facilitation of these enterprises by authorities from different countries.

The third attribute and the biggest similarity that all three cases have in common is the reason why these enterprises had been initiated. The featured cases all contain the common similar attribute such as the local community's complaint or other alarming issues in which AML is affecting their livelihood. Nevertheless, the basic premise of all the incidents that jump-started the restoration involved AML sites affecting the local negatively. For example, the pit in Black Diamond abandoned mine site was causing injury to the locals who strode into the area. The wind from Rooikraal tailing facility (RTF) blew dust and chemical residue to the local farming areas causing pollution and contamination. Lastly, the local communities near the Bunker Hill Mining complex were suffering from the alarmingly high blood lead level, contaminated soil, polluted surface water, and chemical infested groundwater. In fact, some local communities were built on the mine wastes. This attribute is very important as it highlights the stakeholder engagement aspects and stakeholder interests. The information mentioned is compiled in a table as seen in Table 2.

Table 2. AML rehabilitation projects summary

AMLR Projects	Location	Size	Problem
Black Diamond (DMP)	Western Australia (WA)	0.7 km (length)	Pit lake, Safety concern, Fatality.
Rooikraal Tailing Facility (Agreenco)	South Africa	0.01 sq. km	Dust plumes, High-risk dust pollution.
Bunker Hill (EPA)	North America	54.39 sq. km	Contaminated soil and water, High blood lead level, Lead poisoning, Infertile land.

Since each case was represented by one interviewee, it is noteworthy that the information and perceptions are not from all the stakeholders who participated in the enterprises. Instead, they are of few specific major stakeholders.

3.1.1 Research Cases

In this study, the main objective is to understand the stakeholder engagement in the AML restoration projects. The study aims to achieve this objective through the analysis of several AML restoration cases and the processes that took place throughout the lifetime of the enterprise. The following three cases were chosen for the study.

- 1) Black Diamond Rehabilitation Project (West Australia)
- 2) Rooikraal Tailings Facility (South Africa)
- 3) Bunker Hill Mining and Metallurgical Complex, Idaho (United States of America)

3.1.2 Black Diamond Rehabilitation Project

Black diamond rehabilitation project is an abandoned mine rehabilitation project that was initiated by the Western Australian Department of mines, industry regulation and safety. The project is one of the three pilot projects which included the Black Diamond project, Pro-Force project, and Bulong project. In 2019, the fourth project known as the Elverdton project was added into the plan. The second pilot project (Pro-Force project) was greenlit in 2016 and the Black Diamond project was completed in 2018 (DMIR, 2018).

Black diamond is a historical AML site that is situated within the Allanson townsite boundary, Shire of Collie which is approximately five kilometers southwest in Western Australia (DMP, 2015). The coal mining site was in operation between the late 1940s up until the early 1950s and was under the management of Amalgamated Collieries Pty Ltd. and the site was abandoned after the operation ended.

The main problem caused by the Black Diamond site was the forming of pit-lake resulted from the filling of water in the pit. Due to the site being an unregulated recreation area, multiple incidents of people getting injured in the area, as well as a case of a fatality, occurred. After years of raised concerns from the local community, the project was initiated to rehabilitate the site (DMIR, 2018).

The Western Australian's mining and petroleum department (DMP) selected the site as one of the first three pilot projects for their Abandoned Mines Program which would be

funded from the Mining Rehabilitation Fund (MRF) (DMIR, 2018). MRF is a fund gathered and managed under the framework provided by the MRF Act 2012 (DMIR, 2018).

The project began in September 2015 with the identification of stakeholders and their interactions with them. The project followed with different procedural processes including the earthworks, erosion management, weed management and revegetation of native seeds and so on. The site was declared as no longer an abandoned mine site under the MRF Act 2012 in August of 2018 (DMIR, 2018).

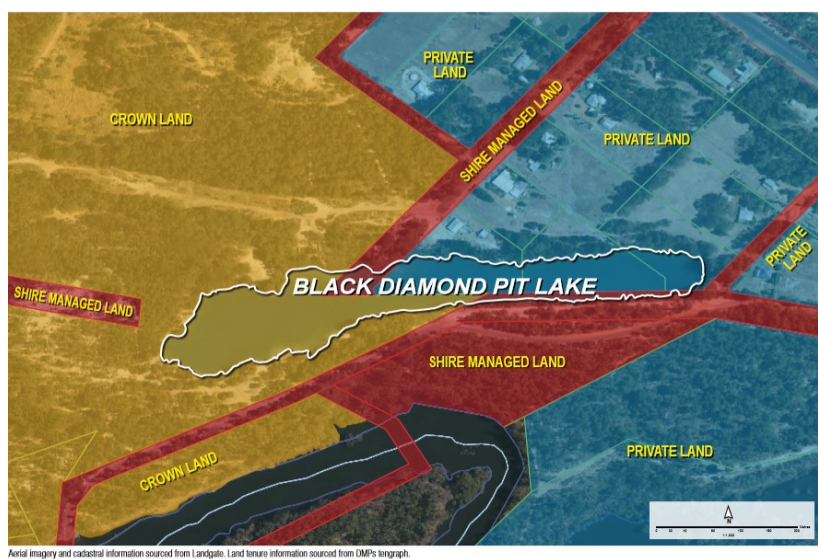


Figure 7. Aerial overview of Black Diamond AML site (DMP, 2017)



Figure 8. Comparison between pre and post-earthwork of the pit wall (DMP, 2015)

Figure 8 compares the state of the pit wall before and after the rehabilitation effort was implemented. The once hazardous area is now safe and suitable for recreation.

3.1.3 Rooikraal Tailings Facility

Rooikraal Tailing Storage Facility (TSF) had been a mine dump facility for years in South Africa. Since no deposition was initiated for years in the site, the facility became the source of wind-blown dust that terrorized the nearby environment which resulted in land and water pollution.

The restoration was done by Agreenco. Agreenco is a mine rehabilitation company operating from South Africa with projects all over the continent. They are known for their service of mine rehabilitation, tailing environmental and dust control, ecological improvement, water management and so on.

The main problem caused by Rooikraal TSF was the spreading of dust plumes which contain multiple combinations of various geomorphological and soil chemical. These plumes settled in the farmlands of the farming (Agreenco, n.d.)

The company undertook the assessment and designed a solution that was robust, cost-effective and could mitigate dust fallout. The bio-windbreaks were implemented perpendicular to the predominant wind direction.

The targeted goal was achieved within 18 months after the implementation of the solution and the dust pollution that the site produced was eliminated. (Agreenco, n.d.).



Figure 9. The before and after top surface revegetation comparison (Agreenco, n.d.)

3.1.4 Bunker Hill Mining and Metallurgy Complex

Bunker Hill mining rehabilitation project sites are located in the State of Idaho, northwestern U.S (EPA, 2015). The ecological revitalization in the site was initiated by the United States Environmental Protection Agency (EPA) in 2001. The site is considered as one of the largest mining districts and yielded commercial minerals such as lead, zinc and various other metals. The mining operations in the area began in 1883 and the activities had since decreased significantly in the 1980s (EPA, 2015).

At the time of this study, three operable units (OU) are under the process of cleanup and rehabilitation. The main issue that led to the prioritization of the site for cleanup is the high blood lead level and lead poisoning in the residents of the area. This is due to the heavy metal contamination in the ground, surface and water, which was mainly due to over a century worth of unregulated mining activities and waste disposal practices (EPA, 2015, p. 1). The erosion and the spreading of toxicity in water have made the situation direr for nearby land, plants, wildlife, and waterfowl. Most importantly, the contamination is actively destroying the natural environment and the human health of the local communities (EPA, 2015, p. 2).

The objective of the rehabilitation is to tend, nourish and replenish the ecosystem of the area. This includes the cleaning of the soil, improvement of the watershed, reduce pollution on the Coeur d'Alene River and so on. The objective was approached using the adaptive management system, meaning that the results of each phase of the project influence the approach and strategy of the next phase (EPA, 2015, pp. 3–4).

As shown in Figure 11, the project began in 2001 and is still ongoing. By 2014, most vegetation in the site was established and more engaging and healthy communities for plant and wildlife were arranged (EPA, 2015, p. 5). According to Moreen, one of the project managers of the site, very significant progress in the reduction of blood lead levels in the community has been achieved by early 2019.



Figure 10. Hillside map of Bunker Hills rehabilitation sites.



Figure 11. Period visual reports of the project progress (EPA, 2015)

3.2 Research Method

3.2.1 Data collection

The research utilized various forms of data that were deemed suitable for the study. The data collection process followed the standard procedures of collecting already available data and in addition to that, new data was generated. The already available data mainly included documents and publicly available information provided by the organizations involved in the featured AMLR cases. Furthermore, new data was generated through phone-based and text-based interviews. All the data was treated as primary data during the analysis.

3.2.2 Text-based interview

The first part of the data collection process was initially intended as a semi-structured interview. The opinions and accounts of the managers from the organizations that engaged in AMLR projects were considered as important data. Although all three managers agreed to be interviewed for the study, some circumstances acted as obstacles during the research period.

The data collection process (requests for information and interview) commenced in early October of 2018 and thirty companies and organizations were contacted through emails. Among the organizations contacted, many of them are major mining companies and government agencies which are mainly from Europe and South America. Although over thirty organizations were contacted, only one organization (Western Australian's Mining and Petroleum department) responded and the first case was received.

During late December of 2018, a connection between a manager from an Australian mining company was made. This further led to the connection between the researcher and the manager of the South African ecological restoration company Agreenco. Thus, the second case was received.

However, despite their utmost cooperation, it was not possible to conduct a skype interview or call interview with both managers due to them being in the mine sites most of the time. After multiple failed attempts, the decision was made to collect the data from them using the text-based method.

The data was collected using text-based communication from two individuals representing two organizations that were in charge of two of the featured cases. For the Black Diamond case, the data was collected from the representative of the Australian DMP (Mining and petroleum department). For the Rookraal Tailing Facility case, the data was collected from the representative of the Agreenco ecological restoration company. In total, 12 pages of new data were generated from the accounts of the two managers.

3.2.3 Semi-structured interview

The data for the third case (Bunker Hill) was generated using a semi-structured interview. Although all the interviewees are knowledgeable and had significant involvement in the enterprises, they did not share the exact type of positions in the cases they were sharing their insights on.

The interview questions were semi-structured yet open-ended. In each section, the questions covering different aspects of the research topics. The direction of the interview was not fixed, and the questions were kept open-ended to allow the answers of the respondents to dictate the flow at which additional questions were generated. As suggested in Silverman (2016, p. 62), an advantage of qualitative interviewing is the opportunity it gives to gather and thoroughly analyze narrative accounts. the mentioned opportunity is valuable for the research. This is because of the autonomy that qualitative interviews offer to the respondents, unlike quantitative data collection.

In other words, it supports the examination of respondent perceptions in a sufficiently liberal fashion, nevertheless within the relevant context of the interview.

Throughout February to April of 2019, the researcher attempted to establish contacts with the North American Environmental Protection Agency (EPA) after receiving a web link to the archive where AML restoration cases were stored. The effort bore fruit

in May 2019 and the third connection was settled. A representative from EPA (Environmental protection agency) was interviewed for the Bunker Hill mining complex case. As AML restoration projects are often different due to the setup and the uniqueness of the AML site, the inclusion of high numbers of cases may over-complicate the variables.

The consent for interview and usage of data for the thesis was received from the interviewees in the form of signatures, which will also serve as evidence of their voluntary participation. Table 3 shows the summarized information of interviews and interview participants.

Table 3. Interviews

Respondent	Respondent's position	Date of Interview	Generated Data	Cases	Label
DMP representative	Manager	8/3/2019 (text format)	Text-based (3 pages)	Black Diamond	DP1
EPA representative	Manager	17/05/2019	Interview (30 minutes) (Transcribed 6 pages)	Bunker Hill	DP2
Agreenco representative	Manager	19/7/2019 (text format)	Text-based (7 pages)	Rooikraal	DP3

3.2.4 Documents

Besides the data generated, data in the form of documents and case studies were utilized in the study. These included the case studies and other miscellaneous documents provided by the organizations that carried out the AMLR case. Many documents among these were made available to the public online by the organization themselves. However, some documents were not made public by the organization and were given to the researcher through the courtesy of the interviewees on good faith.

Table 4. Documents

Cases	Documents' titles	Pages	Place of retrieval	Date of retrieval	Label
Black Diamond	➤ Case Study: Derelict Mine WA	2	All documents provided by the data provider	12/3/2019	DOC1
	➤ Black Diamond Update	1		12/3/2019	DOC2
	➤ Improving Community	4		12/3/2019	DOC3
	➤ Black Diamond Update 2	1		12/3/2019	DOC4
Rooikraal Tailing Facility	➤ RTF One-pager	1	Documents provided by the data provider.	15/5/2019	DOC5
	➤ Case Study	8		15/5/2019	DOC6
Bunker Hill	➤ Bunker Hill Mining Superfund Case Study	11	EPA's archive	10/4/2019	DOC7

3.3 Data analysis

The research was carried out in the form of a qualitative case study. The specific method was Qualitative content analysis. The analysis was done on the data, which consists of perspectives from a major stakeholder who facilitated and participated in the project for each enterprise. In addition to that, further analysis was done through the researcher's investigation and evaluation of the data from miscellaneous documents.

Previously, content analysis has been commonly used as a quantitative tool (Hsieh & Shannon, 2005, p. 1278), since the approach focuses on the words and characteristics of the communicative language. However, the qualitative content analysis aims to explain and clarify the phenomenon of the given context (Downe-Wamboldt, 1992). Although, content analysis is seen as being the easiest research method by researchers, yet it possesses clear and transparent structures (Vaismoradi, Turunen & Bondas, 2013, p. 403). Additionally, content analysis excels in tackling multifaceted and sensitive phenomenon (Elo & Kyngäs, 2007). Furthermore, inductive analysis begins with raw data of multiple sources which are broadened into several specific themes and then are grouped into general categories (Creswell, 2013, p. 188).

3.3.1 Analysis of all generated data

Hsieh & Shannon (2005, p. 1278) suggest that qualitative content analysis emphasizes the attribute of language with major attention given to the meaning behind the context. They further identified the following approaches of qualitative which include conventional, directed and summative approaches.

The conventional approach (Hsieh & Shannon, 2005, p. 1278) aims to describe the phenomenon through the avoidance of preconceived themes and instead allow the data to institute the development of appropriate themes. The directed approach, on the other hand, follows a more structured process to validate the theoretical framework of the subject with the aid of predetermined codes. Lastly, the summative approach combines the conventional and directed approaches with the use of keywords and codes from the interest of researchers or review of the literature. However, the approach tends to

possess less attention for the broader context of the data (Hsieh & Shannon, 2005, pp. 1279–1285).

In this study, the adopted qualitative content analysis approach was the conventional one as the approach focuses on the designation of a phenomenon. In this context, the phenomenon is the stakeholder engagement in AML restoration. The three steps of analysis may be categorized as data making, abductively inferring contextual phenomenon and narration of answer (Krippendorff, 1989). The first step after obtaining the data was the formulation of case records before the coding process. The construction of case records involves the organizing of empirical data for manageability at which the information is stored together under certain logical taxonomy (Eriksson & Kovalainen, 2008). Once the case records are established, the coding commenced which included the labeling of empirical data according to the classification of properties.

After the interview with the representative from EPA was conducted and transcription was completed, the outline at which the coding and analysis followed was derived for the data. The analysis commenced once the outline was prepared. The process started with the familiarization of the data and the familiarization was achieved through many repeating readings of the documents. This was followed by the coding using a series of questions formulated to guide the coding from the data.

The empirical research questions to the data were separated under three headings as follow:

Questions for Stakeholder identification:

- Who are the actors in the data?
- Which spectrum of the stakeholdership are they in?

The first group of questions was designed to look at the involved or affected stakeholder(s) within the received data. The main objective of these questions was to point out stakeholders and evaluate their standings within the project.

Questions for stakeholder interests:

- What are the interests of these stakeholders? What do they achieve from participating in the projects?

The second group contained the question concerning stakeholder interests. Understanding what these stakeholders desired helped in analyzing aspects such as cooperation, interactions, and success in the project.

Questions for stakeholder engagement

- What is the stakeholder engagement in the projects? How is it achieved? How is the interaction assisted?
- What are the outcomes of the engagement?

The third set of questions was grouped under the stakeholder engagement banner. These questions examined the relationship between the outcome of the project and stakeholder engagement.

Following the first section of questions, all the text that mentioned or identified the stakeholders were picked out. The texts that were picked out helped identify their stakeholdership in the projects, as well as their roles. Initially, the codes were separated into two which were stakeholders and project leaders. This was because of the possibility that project leaders that facilitate and manage the rehabilitations could be a non-stakeholder. However, on multiple reviews, it became clear that all the project leaders in the featured cases were in fact stakeholders in one way or another. The identification of stakeholders comprised of picking out various actors mentioned from the data. These mentioned actors were then evaluated on who or what they were to filter out the irrelevant actors which may have appeared in the data.

Posts et al. (2002)'s extended enterprise model was used to subcategorize the stakeholders into their respective levels which are resource base, industry structure, and social-political arena. It is noteworthy that the context was adapted to fit with the study due to the difference in the setting. Through the mentioned process, the stakeholders were mapped out along with their roles and the spectrum of stakeholdership they resided in.

Although the three cases were from Australia, South Africa and the United States of America, the interaction between the researcher and the data providers was done in English. Therefore, during the analysis, the researcher was constantly reminded of this fact and the analysis of the contexts was made preceded.

The next step involved the extraction of data related to stakeholder interests. This assessment of stakeholder interest was done inductively. The process began with the coding using the texts that describe the elements that explain or identify the interest and the reason for the participation of these stakeholders.

For the next level of analysis, the assessments were made into the stakeholder engagement aspects derived from the collected materials. Firstly, the assessment was done on the stakeholder engagement which involved very technical and procedural aspects of the cases. Secondly, the assessment of stakeholder interactions between *non-nature* stakeholders was made.

All the coded texts extracted from the data were then compiled separately on code by code basis. They were then subcategorized again under their appropriate contexts under their umbrella codes.

3.3.2 Data reduction

Since the analysis of the data is intensive and was done on a few in-depth cases of AML restoration cases the data separation was straightforward. Nevertheless, a thorough data reduction had aided in keeping tracks of the research direction as well as to gauge the relevancy of data throughout the analysis. The data reduction process was recorded in a chart where the raw data is transformed into codes through the usage of coding software (*Atlas.ti*). The reduction procedure was based upon the analysis of the research data obtained from various sources. The interview questions are designed to highlight the most important factors of the research and therefore, will keep the respondents on track. The most relevant answers were ones that contained a direct link with the key aspects of the topic. The key aspects were consisted of but not limited to, stakeholder interaction, decision making, and negotiation of demands and so on. As data reduction techniques tend to reduce the effects that front-end disagreements have on the results (Krippendorff, 2004, p. 243), it will also act as a reminder of the research objective.

4. Analysis: Stakeholder Identification

4.1 Preliminary Stakeholder Identification

4.1.1 Stakeholders list

In this section, the lists of different stakeholders for the three featured cases are generated. Due to the location at which they took place, all three featured cases can be considered as their regional level cases. For the analysis, the stakeholder has been grouped into two main categories which are ‘Project leader stakeholder’ and ‘Affected stakeholder’. One noteworthy point in these cases is the fact that most of the project leaders are not affected by these projects despite their major roles in the projects.

4.1.2 Project leader stakeholders

The project leader stakeholders are individuals or organizations that carry the responsibility regarding two important things. The wellbeing and the direction of the projects are the first concerning elements for the project leaders. This could be a variety of issues ranging from funding, goal setting, handling crisis and so on. The second element of concern heavily involves the interaction with other stakeholders that are not project leaders. In other words, these are the parties that are not only important for success but also the most vital for the existence of these projects. However, despite their key involvement, they may not be the most powerful stakeholder of the project.

Project leader stakeholders mainly include:

- **Governmental agencies**

These are the state-funded agencies that assess different sites and problems that the abandoned mine lands (AML) are causing. Furthermore, they are also responsible for deciding the priority of the sites that require rehabilitation. However, most importantly, they are the main forces behind the planning and leading the undertaking of the rehabilitation process.

➤ Clean up company

The Cleanup company plays a similar role as the previously mentioned governmental agencies. However, they are not funded by the state and instead funded by clients who pay them to undertake the land rehabilitation.

➤ Local Authorities (local government)

These are the parties that mainly cooperate with the agencies on various aspects of the rehabilitation project. The main reason they are considered as project leader stakeholders in this study is that the project(s) took place in their jurisdiction. In other words, they had major influences on the local stakeholders.

➤ Ecological agencies

Ecological agencies are the organizations that support and give consultation to the main parties that carry out the cleanups.

➤ Corporation Client

These are the companies that hire the service of the cleanup company and fund the rehabilitation of AML sites of their choice. Although they do not carry out the restoration procedures themselves, they are mainly responsible for the administrative aspects of the project. Furthermore, they are the main party that engages with other stakeholders representing both themselves and the cleanup company/companies.

Table 5 gathered all the organizations and groups classified as project leader stakeholders by the cases. Additional, Table 6 further categorized the project leader stakeholders into more precise subcategories.

Table 5. Project leader stakeholders listed on a case by case basis

Cases	Project leader stakeholders
Black Diamond Rehabilitation Project	<ul style="list-style-type: none"> - Department of Mining and Petroleum (DMP/DMIR) - The Shire of Collie (local authority) - The Department of Lands (local government)
Rooikraal	<ul style="list-style-type: none"> - Agreenco (Cleanup company) - DRDGOLD Ltd. (Client)
Bunker Hills	<ul style="list-style-type: none"> - Environmental Protection Agency (EPA) - Idaho department of environmental quality - Directors of Washington state ecology - Counties commissioners - The town of Coeur d'Alene

Table 6. Further precise subcategorized Project leader stakeholders

	Categories	Governmental agencies	Client	Local Authorities	Ecological agencies	Clean up company
Cases						
Black Diamond		DMP/DMIR		The Shire of Collie The Department of Land		
Rooikraal			DRDGOLD Ltd.			Agreenco
Bunker Hills		EPA		Counties commissioners The town of Coeur d'Alene	Idaho department of environmental quality Directors of Washington state ecology	

4.1.3 Affected Stakeholders

The Affected Stakeholders are individuals, groups or organizations that are affected by the projects in various ways. The extent of the effects these rehabilitation projects had on these stakeholders included both positive and negative repercussions. Some involved themselves in the congregations vital for the wellbeing and the directions of the projects. However, unlike the project leader stakeholders, most of them could only raise their opinions in an attempt to influence the decisions in the forums or meetings without being a part of the deciding parties. Nevertheless, their inputs remained essential to the success of the projects.

➤ Field Worker

The responsibility of field works and the practical rehabilitation process fall in the hands of the field worker. They include experts, manual labors, field supervisors and so on. However, despite their proximity to the sites, they are obligated to follow the order of the project leaders and report back to their superiors.

➤ Communities

The local and broader communities, in most cases, are the most important affected stakeholders in these projects. This is because the majority of landscape restoration and mine rehabilitation projects were initiated due to the outcomes of AML on the nearby communities. The local and broader communities commonly comprise of landowners, residents, indigenous natives, occupational land users, recreational land users and so on. They mainly contribute to the projects by providing information, local knowledge while giving their opinions and concerns through open meetings and forums. However, the demography of the communities (i.e. cultural background, level of education, wealth and political stability) plays major roles in determining the way the communities involved in the project.

➤ Investors

One of the most vital parts of any project is the investment. In AML rehabilitation projects, the investment can come from many sources. In the three featured AML rehabilitation cases, all of them possessed different sources of project funding. The Bunker Hill project was funded by the United States federal government while the Black diamond project was funded by the mine rehabilitation fund (MRF) which includes funds from the Australian government as well as funds contributed by the member mine operators. However, Agreenco was independently funded by their client DRDGOLD to clean the Rooikraal tailing facility.

Table 7 contains all the groups and organizations classified as Affected stakeholders following the cases. Table 8 supplements the classification by further subcategorizing the Affected stakeholders into a more specialized group

Table 7. Affected stakeholders listed on a case by case basis

Cases	Affected stakeholders
Black Diamond	<ul style="list-style-type: none"> - Local community - Indigenous communities - People that wish to recreate - Interest groups - Landowners - Working group - Investor (MRF contributors)
Rooikraal	<ul style="list-style-type: none"> - Neighboring farming communities in the south - Settlements to the north. - Locally hired workers - DRDGOLD
Bunker Hills	<ul style="list-style-type: none"> - The native American tribe (Coeur d'Alene) - Land/Homeowners - Communities (many small towns) - Everybody that recreates (land users) - Residents - Investor (Superfund)

Table 8. Further precise subcategorized Affected stakeholders

	Category	Field Worker	Communities	Investors
Cases				
Black Diamond		Working group	Local communities Indigenous communities People that wish to recreate Landowners	MRF contributors
Rooikraal		Locally hired workers	Neighboring farming communities in the south Settlement to the north	DRDGOLD Ltd.
Bunker Hills		EPA	The Coeur d'Alene tribe Land/Homeowners Communities Everybody that recreates Residents	Superfund (States)

4.1.4 Natural environment stakeholder

Among all of the stakeholders involved in these cases, the least often mentioned stakeholder is the natural environment itself. In the ecological restoration process, the site and its ecosystem are the most crucial components. Without the site or the natural environment, there would have been no reason for the restoration. Besides the truism, nature is the stakeholder that holds the biggest influence over the wellbeing and the direction of these projects. All of the data providers for this study to an extent agree that even though the natural environment interacts with other stakeholders in unconventional ways, it is undoubtedly a stakeholder. Furthermore, in every AML rehabilitation project, stakeholder interaction between the natural environment and other stakeholders occurs very extensively albeit without being aware. The most essential and earliest stakeholder interaction with the natural environment occurred in the form of the site assessment.

During the second stage of the project, a detailed site assessment was carried out to identify the levels and magnitude of safety and environmental issues and to generate potential solutions. (DOC1.)

Moreover, in AML rehabilitation projects, the entire goal of the initiation is to aid the recovery of the site. The conception of the projects can be traced back to the interaction between other stakeholders and nature.

The natural environment is very much a stakeholder when thinking about what it means when EPA's mission is to protect the environment, you are talking about the ecosystem. (DP2.)

In the case of Rooikraal, the natural environment is not only the subject of their rehabilitation, but it is also a vital part of their business. Businesses are liable for the effects their operation brought upon their stakeholders, and the natural environment is no different.

Many parts of the project that I mentioned earlier definitely showed how mother nature can impact everything in both good and bad ways. I believe nature is one of, if not the most important stakeholder in our business. (DP3.)

In addition to the stakeholder interaction of the natural environment during the entirety of the projects, the interaction continues even after the project is over. For example, in all the featured projects as well as in the SER 51 steps guideline (Clewett & Aronson, 2013), strategies and assessment for post-project maintenance of the integrity of the ecosystem are given great importance.

In conclusion, when stakeholder engagement is concerned, a factor as dominant as the natural environment which every involving party has to interact with should be kept as a stakeholder of high regard.

4.2 Mapping of Stakeholder sub-categories

Based on the coded research data listed previously, the stakeholders and their standings will be displayed using Post et al. (2002)'s new stakeholder model. The model is adjusted and adapted mainly for compatibility purposes. The stakeholders will be placed in the position that orbit the AML rehabilitation projects, representing the different dimensions of their standings. In Post et al. (2002)'s model, the stakeholder's classification includes the relationships between the stakeholders and the AML rehabilitation projects. The classification shows that the majority of the major stakeholders are dispersed heavily in the socio-political arena and industry structures. However, the resource base level only includes a few small stakeholders mainly the working groups and investors. Furthermore, it is noteworthy that a few of the stakeholders can be seen to belong in more than one dimension of the model. The complete breakdown of the mapping of stakeholders and their standings are shown in the preceding sections.

4.2.1 Extended enterprise model

As discussed in the theoretical framework section (2), the extended enterprise model emphasizes the network aspects between the stakeholders and the corporation. Unlike in the contemporary case of traditional corporations, stakeholders in AML rehabilitation projects tend to possess different agendas and interests of their own. Despite the differences in interests, all of the stakeholders support the success of the projects. In Figure 12, the illustration describes the generated stakeholder subcategories in parallel to Post et al. (2002)'s extended enterprise model.

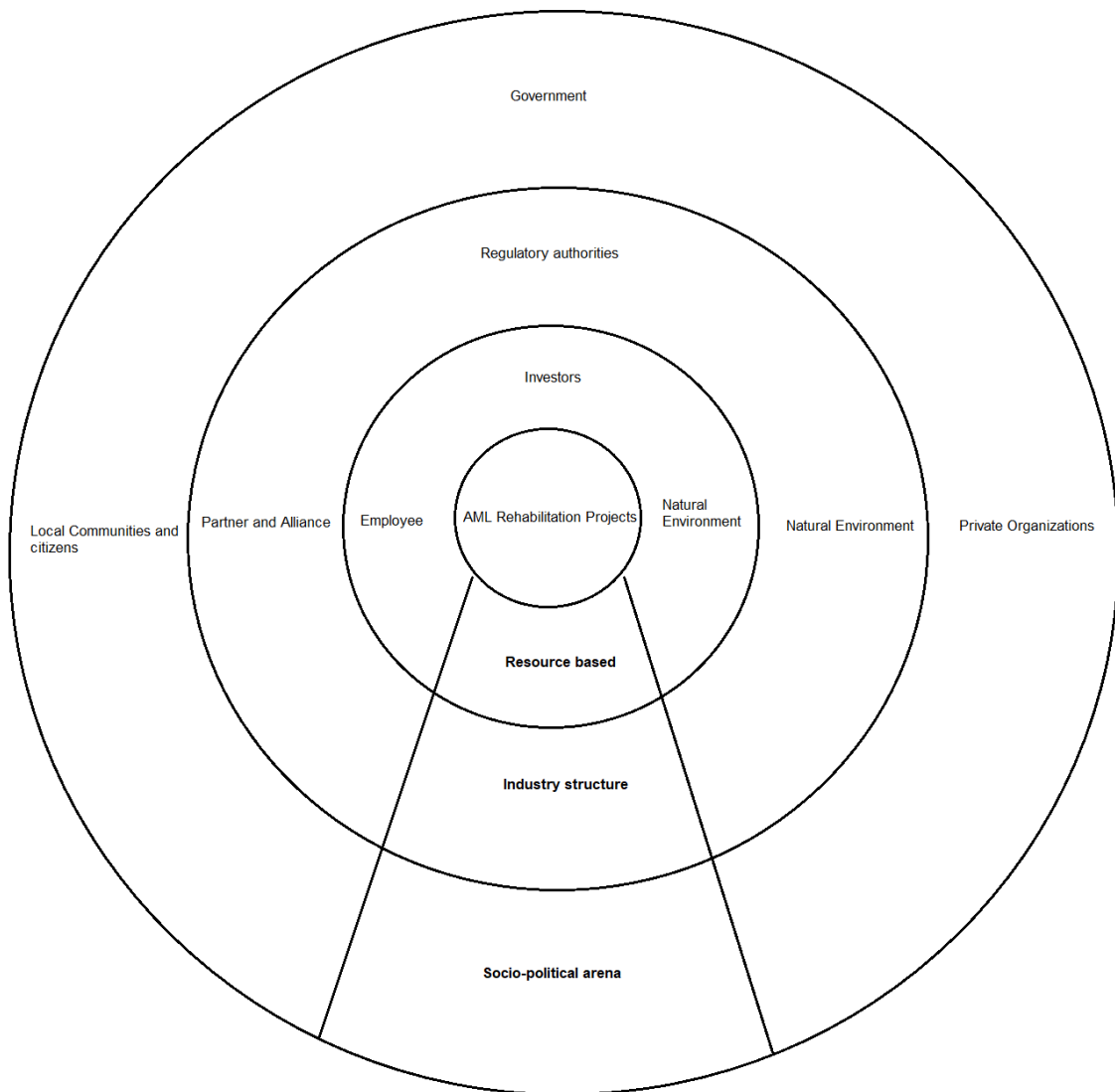


Figure 12 Mapping of Stakeholders in AML rehabilitation project including specific subcategories under Post et al. (2002) extended enterprise model.

4.3 Analysis of mapped stakeholder sub-categories

The identification of stakeholder roles and classifications were mapped in the previous section using the extended enterprise model. For accurate data translation, the illustrations were done twice using different dept of classifications.

The most intriguing part of the map is the appearance of certain stakeholders in multiple dimensions. This was the result when each stakeholder involved in the AML

rehabilitation projects were examined based on both their organizational label as well as their roles. For example, the United States environmental protection agency (EPA), from one perspective, is a governmental agency that mainly performs the roles of regulations, administrations, and assessments of environmental issues. However, when viewed from the perspective of their fieldwork roles in the Bunker Hills mine rehabilitation project, EPA was qualified as a stakeholder from more than one subcategory on the map.

Further analysis of the map showed that the project leader stakeholders were mainly dispersed within the dimensions of the socio-political arena and industry structure. However, the affected stakeholders were scattered among the dimensions of the socio-political arena and resource base. It is noteworthy that the *investor* stakeholders were the affected stakeholders that were placed only in the resource base dimension. This can be explained by looking into the context of each case.

We do many things here in DMIR, but mainly we coordinate the rehabilitation or management activities associated with land declared as an abandoned mine site for gazettal (with the Abandoned Mines Program) under the Mining Rehabilitation Fund Act 2012. (DP1.)

... so [,] US congress appropriates funds every year [...] but when the congress appropriates funds and the president signs that Infolog and that those funds are distributed to all the agency affected by the funding appropriation, and all US agencies are dependent of those appropriation bills for funding. (DP2.)

In the cases on Bunker Hills and Black Diamonds, the projects are partially or fully funded by the government. Although the Mining rehabilitation fund (MRF) is managed by Western Australian DMIR, they only carry the role of *investor* stakeholders when they are handling the fund. In the case of US EPA, the fund comes from the congress, however, the party overseeing the projects is the EPA. In other words, despite being the same actors, the stakeholder role of *investors* remained fixed in the resource base dimension. For instance, it is visible from the stakeholder map that actors such as EPA, DMP, DRDGOLD, and Agreenco shifted their stakeholder roles constantly. Thus, resulted in their multi-dimension appearance on the stakeholder map.

The data distinctly pointed that the main project leader stakeholders of their respective projects were DMP/DMIR (Black Diamond, WA.), EPA (Bunker Hills, Idaho) and Agreenco (Rooikraal, SA.). Despite their most vital role as project leader stakeholders in the featured cases, they were still under higher authorities. In the Rooikraal TSF rehabilitation project, Agreenco was given fair autonomy over their approach of the choice to the cleanup. However, Agreenco remained reliant on their client DRDGOLD for supervision and funding.

Unlike the state bodies such as the US and Australian governments, DRDGOLD is merely a multinational company. Although DRDGOLD possesses a significant amount of influence and monetary strength, it is still not comparable to the former group of stakeholders when the factor of the safety net is concerned. This additional stake is the most logical explanation of why DRDGOLD had more involvement in the project.

The most challenging aspect of stakeholder mapping involved the placing of the stakeholder 'natural environment' within the model. It became clear from the data collection that all the project leaders gave high regard to the concerns about the natural environment. However, most of them did not put many thoughts into the stakeholder status of the natural environment. Among the three data providers, only one of them gave a clear answer to their stance on the status of the natural environment albeit others agreed with the legitimacy of the stakeholder status of the natural environment.

...the natural environment is [the] vital part of our business and I believed it is our moral obligation to look [after]/take care of this stakeholder. (DP3.)

Under the premise presented by the definition of ecological restoration provided by the Society of ecological restoration (SER) (2004, p. 3), the natural environment is on a constant process of healing and revitalizing. Ecological restoration or rehabilitation assists and reinforces the natural environment to speed up and make the process more efficient. Therefore, the first stakeholder category that the natural environment was placed on the map was the category of Employee in the resource-based dimension.

Secondly, the natural environment also plays the role of regulatory authority in AML projects. However, the role is carried out in unconventional ways. The exact interaction and regulatory actions will be discussed in the further section of the analysis.

It is a fair way to view it (ecosystem as a stakeholder) but it's voiceless.
(DP2.)

Due to the ability of the natural environment in commanding the direction of the AML rehabilitation projects, the natural environment is also placed in the dimension of industry structure within the model.

4.4 Summary of stakeholder identification

Table 9 summarizes the identification and multi-level categorization of stakeholders in featured AML rehabilitation cases. The classification adopted the adapted version of Post et al. (2002) refined the stakeholder model.

The classification of the stakeholders involved in the featured AML rehabilitation cases mainly views their organizational roles and standings. Moreover, it is noteworthy that all the stakeholders reprising in multiple categories are primary stakeholders as they are directly affected (Clarkson, 1995) by the projects. However, in a self-contained scenario such as AML rehabilitation projects, stakeholders with significant interactions are primary stakeholders regardless of them being big or small actors. Now that the mapping is done, the next part of the analysis will be on the stakeholder interests in the featured AML rehabilitation projects.

Table 9. Summary of stakeholder identification and categorization

Category	Stakeholder	Classification (Post et al., 2002)	Cases
Governmental agencies	DPM/DMIR EPA Natural environment	IS* IS IS	Black Diamond project Bunker Hills project All
Cleanup company	Agreenco	IS SPA**	Rooikraal project
Local authorities	The Shire of Collie DL (WA) Counties commissioners Coeur d'Alene (town)	IS IS IS IS	Black Diamond project Black Diamond project Bunker Hills project Bunker Hills project
Ecological agencies	Idaho DEQ Washington DE	IS IS	Bunker Hills project Bunker Hills project
Client	DRDGOLD	IS SPA	Rooikraal project
Field Worker	Working group Locally hired workers EPA Natural environment	RB*** RB RB RB	Black Diamond project Rooikraal project Bunker Hills project All
Communities	Local communities Indigenous communities Land users Landowners Farming communities Settlements Coeur d'Alene tribe Landowners Communities Land users Residents	SPA SPA SPA SPA SPA SPA SPA SPA SPA SPA SPA	Black Diamond project Black Diamond project Black Diamond project Black Diamond project Rooikraal project Rooikraal project Bunker Hills project Bunker Hills project Bunker Hills project Bunker Hills project Bunker Hills project
Investors	MRF DRDGOLD Superfund	RB RB RB	Black Diamond project Rooikraal project Bunker Hills project

*IS = Industry structure

**SPA= Socio-political arena

***RB= Resource based

5. Analysis: Stakeholder interests

5.1 Identification of Stakeholder Interest

Stakeholder interest identification was a prevalent task in all three featured AML rehabilitation cases. The data consistently agrees that the organizations recognized the importance of stakeholder interest.

Potential stakeholders were identified through an identification workshop carried out by DMP. (DOC1.)

It makes our job easier if we know what the stakeholder wants and what concerns they raise for the projects. (DP2.)

Understanding stakeholder interest and demand also help to succeed. Helping stakeholders understand the benefit of rehabilitation is also a worthwhile effort. (DP3.)

According to the data, in Black Diamond and Bunker Hills cases, extensive efforts were put into the identification of stakeholders' interests from the affected stakeholders. However, in the case of Rooikraal, unlike the other cases, the scope of stakeholder interest considered seemed smaller in comparison. The difference in the effort can be attributed to two factors. These factors include the organization types and the purpose of the projects.

The heads of the project for the featured AML rehabilitation cases are Western Australian DMP, United States EPA and Agreenco. Among them, DMP and EPA are governmental agencies while Agreenco is a cleanup company. This difference limits the capability of Agreenco interaction with other stakeholders as the organization still had to answer to their client or customer which is DRDGOLD in this case.

Secondly, the objectives of the three projects were vastly different. Although Black Diamond and Bunker Hills projects were significantly different in scale and focus, they

were essentially initiated based on public safety. On the other hand, despite the excellent rehabilitation work that Agreenco had carried out in Rooikraal, their main purpose in undertaking the project was to provide service to their clients. In other words, Agreenco possessed neither the resources nor the authorities in bringing together all relevant stakeholders, unlike its counterparts.

Our mission is to protect human health and environment. So, we do need to stick to our mission, that being our primary driver to what we are carrying out (DP2.)

Many issues were raised including the safety hazard of the pit wall, water quality, wastes, anti-social behaviors and the general absence of management. (DOC4.)

For us, our customer's environmental liabilities are natural assets. (DP3.)

Based on the contexts regarding stakeholder interests from the data, three categories of stakeholder interest were generated. The three include wellbeing interest, economic interest, and utilitarian interest.

5.1.1 Wellbeing Interest

The category includes the stakeholders' interests that mainly focus on the wellbeing of the stakeholders that are affected by the AML and its rehabilitations. As AML reclamation projects are ecological restoration projects, they possess the innate objective of reparation. The wellbeing interest considers all the stakeholder interests that are for the betterment of communitive wellbeing as well as the ecosystem. The factor of urgency is also presented dominantly within this category of stakeholder interests. One of the main objectives of the AML rehabilitation projects which are to revitalize and repair the AMLs. This objective is the epitome of wellbeing-oriented stakeholder interests, especially towards the natural environment.

Furthermore, the data reveals that the cases of Black Diamond and Bunker Hills carried the stakeholders' wellbeing interests prominently. In addition to the interest in

revitalizing and repairing the AMLs, the projects targeted to solve the health issues and hazards that were caused by the two sites.

Mitigation of safety hazard involving the southern pit wall and remedial effort on the heavily eroded part of the site. (DP1.)

When that occurred then, EPA was requested to come to the site and it was necessary for EPA to come to the site and start investigating and also taking early emergency actions. (DP2.)

Historical unregulated mining activities had led to lead contamination which further causes the health risk to the people and environmental threat. EPA's goal is to mitigate this risk through collaboration with partner organizations. (DOC7.)

The data also points out that even in the case of the private cleanup initiatives such as the Rooikraal tailing facility cleaning project, despite the smaller legal obligation to put the interests of the external parties into consideration, the wellbeing interests remained prevalent. In addition to the ecological aspects of the rehabilitation process, other communitive factors were solemnly considered.

The only concern from the locals was that we hire their labor for the project. (DP3.)

5.1.2 Economic Interest

Among the various types of stakeholder interests presented in the AML rehabilitation projects, economic interest appeared in two of the three projects as crucial. In the Black Diamond rehabilitation case, the economic aspect of stakeholder interest was never brought up. This can be attributed mainly to the size and ownership of the land that was rehabilitated.

The data shows that when private lands were involved in the rehabilitation, economic interests became a big concern. It is crucial to comprehend that the economic aspects

of stakeholder interest come in many forms depending on the region and political structures of the AML sites. As mentioned earlier, the Rooikraal rehabilitation projects had a great impact on the livelihood of the surrounding communities, as the locals relied on those lands to earn their living. Another form of stakeholders' economic interests can be seen from the demand they made that locals be hired for the labors required for the project.

The Bunker Hill case presented very different styles in economic-related stakeholder interests. The interests mainly involved the property values as well as the regional development aspects.

They [stakeholder] don't want superfund stigma to degrade their property value. (DP2.)

They want economic developments and that certainly [is] something that we try to help them, set them up for success and many times we remediate properties and look to redevelopment. (DP2.)

The comparison of the data contexts between the cases reveals the correlation between the size, the range of impact of the rehabilitation process, the head of the project and the economic stakes.

5.1.3 Utilitarian interest

Although the utilitarian interests appeared to carry little weight when compared to the interests presented in the previous sections, it is nevertheless an influential one. Similarly, to the economic interest, the data showed that the interest presented only when the AML site is accessible freely by the public.

Recreational usage of land was an important aspect that the project leader had to put into consideration for Black Diamond and Bunker Hills cases. The data implies that recreating is one of the main objectives of the locals in both areas regardless of their demographic status and their economic backgrounds. This can be potentially attributed to the culture and zeitgeist of the region. The interest stemmed from the concerns of

possible effects the AML rehabilitation projects could have on the stakeholder's ability to use the land.

want to be able to recreate freely including many times they will ignore the educational efforts, continue riding motorcycles and altering vehicles on old mine sites. (DP2.)

Stakeholders voiced that the recreational day-use to be the preferred end usage of land for the site. (DP1.)

Further relevant utilitarian interests from the featured cases were related to the locals and communities that reside near the region. In Bunker Hills and Rooikraal cases, there were distinct and insidious effects that were oblivious to all that live near the sites. The toxicity and contamination had caused many in the surroundings of their livelihood and health hazards.

Our attempt to address lead is accompanied by our attempt to address dissolved metal, the worst of that is zinc that is highly toxic to the aquatic life particular fish and invertebrates. (DP2.)

5.2 Summary of stakeholder interest

The stakeholder interests presented in the previous section were ultimately grouped under three categories which are well-being interest, economics interest, and utilitarian interest. The different interests expressed by the stakeholders in these projects possessed diverse underlined values. The analysis of the context from the data showed the complexity within the stakeholder interests that represented personal values and ecological values.

In all three featured cases of AML rehabilitation projects, the understanding of what the stakeholders wanted was an important key factor. The diversity in stakeholder interests and the final decisions made by the heads of the project demonstrated that the factors such as types of AML restoration and the regions of the restoration also dictate the values stakeholder upheld.

6. Analysis: Stakeholder engagement in AML rehabilitation

Stakeholder engagement occurred throughout the AML rehabilitation projects between many stakeholders. However, it is crucial to address the detail that the stakeholder engagement differed in different phases of the projects. The analysis emphasized the different stakeholder interactions that took place in all three featured cases as well as the effect of stakeholder engagement on the outcome of the projects. Two aspects of stakeholder engagement in AML rehabilitation – Directional and Pragmatic – were identified.

6.1 Directional aspect

Throughout their life cycle, the directions of the rehabilitation projects were discussed and adjusted according to the results, uncertainties and many other factors. In the data, all three managers of the featured projects emphasized the importance of this aspect. However, the extent of the stakeholder engagement in navigating the project varied in all three projects. In the cases of Western Australian's DMP and the United States EPA, the autonomy in decision making for projects' direction was more extensive. However, a company such as Agreenco needed to rely on the approval of its client. These were the results of the difference in the types of organizations. Nevertheless, the interactions between these heads of the projects and other stakeholders were essential for the success of the project.

After finalizing the decision for the site to become a managed recreation area, strategies to maintain the future stability and integrity of the site were consulted. (DOC1.)

The stakeholders and the community in large have an opportunity to comment on that plan and has resulted in significant changes in many things we do. (DP2.)

We interact with local communities and other stakeholders, but many decisions making comes from our client. (DP3.)

More importantly, the data addresses that the objectives of the projects' direction related to stakeholder engagements were to identify the interests of both the involved and non-involved affected stakeholders. Secondly, the free flow of information provided transparency for the stakeholders.

Stakeholder engagement is a key aspect of the program and input from stakeholders is sought for each project to ensure that stakeholder concerns and expectations are identified and addressed (DP1.)

Although the decisions were eventually made by the key stakeholders with authorities, in all three cases, the inputs of the other stakeholders were considered. Regarding the degrees of consideration, the data, however, implies that the degrees differed significantly between cases.

... the work that is ongoing or just planned and those aspects are discussed on that public forum. That's another kind of significant community outreach... (DP2.)

These stakeholder engagements regarding the directions of the projects in all the cases provided the closure to all the stakeholders. In the Bunker Hills case, there was a report of conflict of interests from some stakeholders. Differences of opinion from stakeholders were also reported in the Black Diamond case. The data credits stakeholder engagement as the factor contributing to these conflicts and disagreements not interfering with the projects.

Yeah, you can't carry out a cleanup like this without having a difference in opinions and having conflicts arise. (DP2.)

Yes, differences of opinion have arisen between stakeholders during projects. In projects like these, you have to expect conflicts. That is why

we need to be open with communication when presenting the project directions to the stakeholder. (DP1.)

The concerns of conflicts and disagreements in all the featured cases were dealt with during the planning phase of each stage. The steps that were taken in these situations generally focused on providing information and attention to the stakeholders. Despite these steps, the main objectives of the rehabilitation were respected.

We tried to sit down and work those issues out with stakeholders when those issues come upon each case, provide them with accurate information, make ourselves available, make sure that they know what information we have... We can't always address their issues as the world is not that simple, so there's going to be times when not everybody is happy. (DP2.)

To date, there has not been a need to compromise on decisions or actions associated with the projects. This is because the project objectives decided on by the majority of stakeholders have been clearly documented for all stakeholders. (DP1.)

However, in a small-scale project with lesser stakeholders involved such as Rooikraal, the interests of the other stakeholder were easily met and conflicts were avoided.

We have used local labor and therefore they were pleased, and this helped to keep the conflicts to the minimum. (DP3.)

Fortunately, there was no conflict with the client, neighboring farmers or communities during the operation of this project. (DP3.)

In the research data, the stakeholder engagement in the directional aspect of the featured projects was shown to be a crucial part of the projects. The information received from the stakeholder interactions and the opportunity to provide information through these interactions were valued highly by all the managers of featured AML rehabilitation projects.

6.2 Pragmatic aspect

The second aspect involves stakeholder engagement concerning the implementation of actions and plans. Unlike the aspect mentioned previously, this aspect focuses more on cooperation and collaboration. The stakeholder engagement regarding this aspect mainly occurs between stakeholders including the rehabilitating parties, the individual and group on the sites and the natural environment. Due to the nature of AML rehabilitation, the approaches taken in cleaning up were required to be adjusted.

According to the data, extensive consultation was carried out for stages of cleanup and cooperation between various parties was needed. Although it may seem that the working group stakeholders were the key performers during the rehabilitation process, the data suggests otherwise.

After half a year of constant communication, management of erosion and battering of walls were implemented. (DOC1.)

Cooperation from all involved stakeholders was crucial to the cleanup process and land conversion efforts. (DOC7.)

The most prevalent yet subtle stakeholder engagement occurred between the projects' leading and facilitating stakeholders and the natural environment itself. The interaction began with the assessment that the working team had to go through before deciding on the approaches for rehabilitation. DMP, in the case of Black Diamond, worked on their engineering design plan that was not only approved by the AML site in terms of compatibility but also approved by other stakeholders,

Engineering design was made following the endorsement and approval of working groups and local stakeholders. (DOC1.)

The stakeholder engagement between the natural environment and Bunker Hills working team was expressed in the form of adaptive management. The rehabilitation approaches were tweaked and adapted based on the result and data obtained from the preceding undertaken processes.

The implementation of adaptive management allowed the uniform adjustment and the making of decisions as the project moved forward phase after phase. (DOC7.)

In the case of Rooikraal, besides the adjustment that was required due to the uncertainties from the natural environment, the team had to adapt to the theft problem that obstructed the process of rehabilitation.

The data distinctly expresses the reliance of the AML rehabilitation projects on the conditions and results obtained from the natural environment before proceeding forwards. It emphasized the notion that more than just the working group stakeholders were involved throughout the rehabilitation process. On one hand, the AML rehabilitation demands an elaborated and well thought out plan to initiate, while on the other hand, the plan cannot be followed in static format and needs constant adapting. The data addresses this point through the regular meetings and discussions between the involved stakeholders in all the featured projects.

6.3 Assistance for stakeholder interaction in AML rehabilitation

Besides the importance and prevalence of stakeholder engagement in AML rehabilitation projects, the data provides an additional scope on the effort the organizations put in assisting the occurrence of the stakeholder interaction. In all the cases, the organizations seek to put significant efforts and resources to this aspect. These assistances were in many forms including communication platforms, meetings, and mediators.

The data addresses that organization such as EPA in many cases had offered grants to assist in communicating and educating the stakeholders. However, due to the sheer scale of the Bunker Hills rehabilitation projects, EPA mainly focused on public bulletin and education programs.

... grants available through EPA that have been issued in the past. Typically called tactical assistance grant... We also have a number of

educational programs, we provide quarterly basin bulletins that provide updates on our work. They help to educate people, bring people and make people aware of things like blood lead... (DP2.)

The assistance that all three cases had in common was the mediator. EPA and DMP acted as mediators between stakeholders if needed, however, both parties expressed that communication amongst themselves was encouraged. On the other hand, since the communication with other stakeholders was mainly done through their client (DRDGOLD), only a mediator between Agreenco and DRDGOLD was established.

Currently, most communication has taken place through the Abandoned Mines Program facilitating meetings... stakeholders are free to communicate amongst themselves. (DP1.)

*His name is *omitted* (environmental consultant), he was our consultant and did give feedback to the client on a weekly basis. He is mainly responsible for the communication between our clients and our specialized teams. (DP3.)*

Follow-up stakeholder engagement assistance such as site monitoring, health intervention, and even economic development assistance was seen presented in Bunker Hills cases.

7. Discussions

7.1 Stakeholder Engagement in AML rehabilitation projects

Stakeholder engagement is one of the essential elements for organizational projects as it involves those that either effect or are affected by the project under respective procedures (Sloan 2009; Jefferey 2009; Pacheco & Garcia 2012; Macdonald 2018). Ecological restoration projects benefit the same ways from Stakeholder engagement. As the AML restoration project is the less popular niche among ecological restoration literature, the objective of this study is to evaluate the various aspects of stakeholder engagement within this niche.

Two main categories of stakeholders (Project leading stakeholder & Affected stakeholder) were identified and eight more were subcategorized based on their purposes and their contributions to the three featured AML rehabilitation cases. In this study, the aspects of when stakeholder engagement occurs and how stakeholder engagement influences the projects were focused. Figure 13 shows a detailed illustration of the relationship between stakeholder engagement and AML rehabilitation projects.

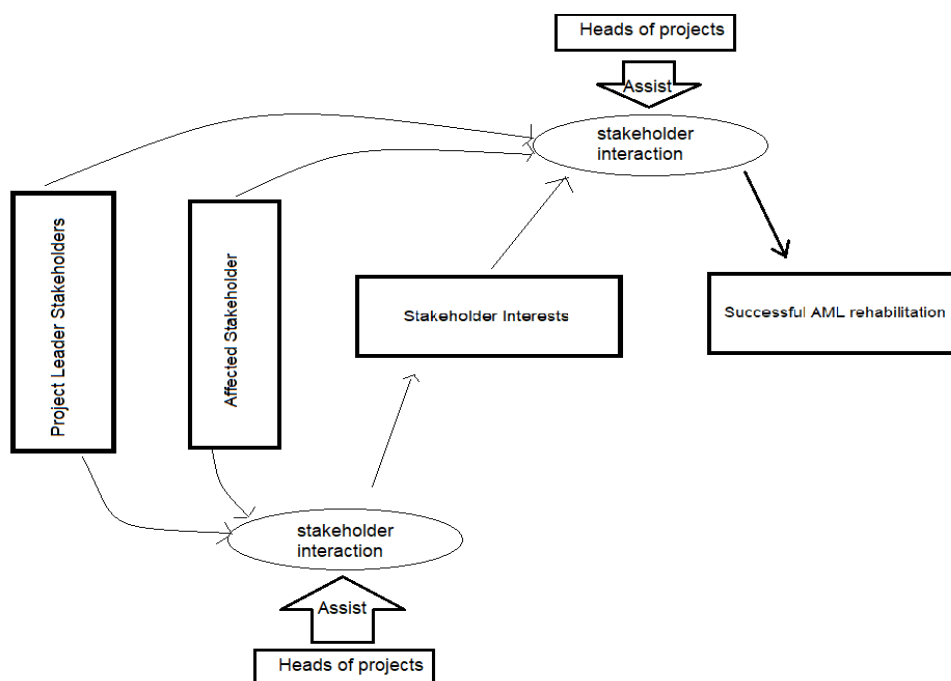


Figure 13. Stakeholder engagement in AML rehabilitation projects

As shown in Figure 13, stakeholder engagement was presented in every stage of the featured cases. However, the roles of the stakeholders varied. It can be seen that stakeholder interaction acted as a tool whereas the stakeholders utilized to convey their interest. Moreover, the interaction was used by stakeholders as a means to achieve their interests as complementary results of rehabilitation. As agreed by all the data providers (DPs), stakeholder interest was significantly valuable for the success of the projects. Therefore, the heads of projects assisted and facilitated the stakeholder interaction that happened throughout the projects.

The conclusion of the study will be presented in three parts covering three prominent aspects of the stakeholder engagement in AML rehabilitation projects.

Proposition 1: Stakeholder engagement commences immediately after the site is assessed and chosen for rehabilitation before the detailed planning process. This is due to stakeholder evaluation and stakeholder interest being essential factors in the projects.

The findings of this study indicate that the heads of the projects understood firmly on the importance of stakeholder engagement within the rehabilitation. The fluidity of the project could be affected if the stakeholders' concerns are not handled properly. Additionally, such mishandling could lead to detrimental effects such as disruption and uncooperative relationships. Consistent participation, willingness to cooperate is as important (Onkila 2011; Russier 2018) as the participant's knowledge (Jeffery, 2009) and understanding of the project.

In the three featured cases, information flows were kept as a high priority between project leader stakeholders and affected stakeholders. The transparency was achieved using platforms for public concerns, educating plans, proxies and so on. Although the bargaining power differed between cases, in cases such as Black Diamond and Bunker Hills, the interaction with affected stakeholders were more closely established. However, it was reasonable to expect non-governmental agencies such as Agreenco or DRDGOLD to have more limited interactions.

Despite the value placed on the affected stakeholders' interests, in all three cases, the rehabilitations themselves were kept as the highest priority interests. Although in all the

cases efforts were put into compromising everyone's interests, both representatives from Bunker Hills and Black Diamond admitted that tough decisions were made. Closures and transparency were given to all regardless of the final decisions. In the study, the stakeholders were categorized based on their roles and contribution towards the cases. Even though many of the stakeholders shared overlapping categories, the relationships between their roles and the projects themselves were reciprocal.

Proposition 2: Stakeholder engagement with the natural environment is an extensive and complex process. This engagement occurs before, during and after the rehabilitation.

The main objective of the Bunker Hill project was to eliminate health hazards (high blood lead levels) from the area. Black Diamond project aimed to remove the location hazard (pit) and Agreeco's was to mitigate dust from the AML site that was terrorizing the locals. Despite these different end goals, they all had to achieve them through AML rehabilitation.

The interaction between the rehabilitators and the site (natural environment) started since the preparation. The interaction involved various kinds of assessments, planning, engineering and so on. During the rehabilitation process, the interactivity became further intense because the rehabilitators were tasked with the responsibility to read and adjust based on the responses from the sites. These responses are extremely important as they represent the stakeholder interests of the natural environment. These responses were described in various forms within the featured cases. EPA handled their site using an adaptive management system and DMIR adopted the multi phases procedures. Agreenco also had to make several changes and adjustments due to factors such as the characteristics of the site, unforeseen circumstances (storms, flood, etc.) and so on.

Stakeholder interest is one of the vital factors of successful AML rehabilitation projects and the voices of all stakeholders are important. However, the stakeholder interest of the natural environment carries a higher weight as it affects the rehabilitation efforts most directly in comparison to others.

The post-project interaction was described as monitoring and maintaining the rehabilitated sites. The responsibility will go to the party or parties that the facilitators deem to be most qualified or appropriate.

Proposition 3: Successful stakeholder engagement in the AML rehabilitation project allows the transferring of confidence and know-how to the next stage of the project or the further projects.

In an organization or project, the interactions which create values could come in the form of any engagement (Kujala, Lehtimäki & Myllykangas, 2012). In AML rehabilitation projects, it comes in the form of successful rehabilitation and met/unmet stakeholder interests. It was agreed among the data providers that it is not possible to always compromise or avoid conflicts. Therefore, to create trust and closure, the head of the projects poured efforts into either achieving met stakeholder interest or unmet but well informed and justified stakeholder interest.

As both happy and not happy stakeholders are vital to these projects, their cooperation could only be obtained if they perceive the project to create value to them in one or the other way. In an extended project such as Bunker Hills, the relationship developed with stakeholders became more valuable as the project further proceed. As for Black Diamond and Agreenco, the success they received from the outcome of the featured project will undoubtedly aid in their proceeding projects.

7.2 Managerial implications

The study focuses on the AML niche among the wide varieties of Ecological restorations. It proposes the prevalence of stakeholder engagement during the life cycle of the AML rehabilitation project. Furthermore, the findings emphasize the need for the stakeholders to nurture and assist the interaction before, during and after the projects in diverse ways. Understanding the stakeholder engagement within the anatomy of the rehabilitation projects not only aid in conceptualizing the impact that well-nurtured interactivity could have on the success but also on making other strategic decisions.

It is common in most and earlier researches to address ecological restoration as a whole (Mansourian, 2016; Syme & Rusche, 2018; Nunes, 2018; Clewell & Aronson, 2013;

Higgs et al., 2018; Clayton and Myers, 2015) under an umbrella term. However, it is important to understand that each type of ecological restoration could be widely different from another. In the case of AML rehabilitation, there are a large number of anthropomorphic actors involving in the revitalization process. Therefore, it is crucial to pay attention to each type of ecological restoration individually. However, with that being said, there are also many similar aspects that all the ecological restoration shares. Therefore, knowledge from various specialization can be undoubtedly useful.

One of the three cases featured in the study was a long-term project (Bunker Hills) while the other two were short-term projects under AML rehabilitation standard. However, in the case of Western Australian DMIR, Black Diamond was their first pilot project among a series of other AML rehabilitation projects. Similarly, Agreenco is constantly cleaning up sites. Therefore, even the short-term projects for these organizations are parts of their long-term organizational objectives. The transition to a long-term relationship from a short-term relationship is a viable means of developing trust (Kujala et al., 2019) and stakeholder engagement aid in achieving the mean.

Practical implications may include more efficient and effective ways to assist stakeholder engagement through better communication enhancement, customized platforms such as public forums and better educational and informational efforts. Since AML rehabilitation projects consume significant funding and time, protecting the rehabilitated AML sites from going back to its previous damaged state is crucial. This requires cooperation and commitment from stakeholders long after the project is finished and the head of the projects had moved on. Development of trust between stakeholders, educated and well-informed actors and most importantly a transparent system will truly ease the efforts required. Therefore, significant investment and research on further enhancing the assistance of stakeholder engagement will not only improve the AML rehabilitations but also ecological restoration as a whole.

7.3 Limitations and Suggestions

As the study is qualitative, the validity of the research may be evaluated through the analysis of the methods chosen and the reasoning given. The procedures and justification for the choices made were documented in detail along with the analytical

process throughout the study. In this study, the multifaceted characteristics of the subject of research are handled with importance and thus research method that accommodates such phenomenon (Elo & Kyngäs, 2007) was utilized to control the reliability. This Master's thesis is mainly written from the perspectives of the head actors of the featured AML rehabilitation projects.

As stakeholders are essential parts of ecological restorations (Everingham et al., 2018) and due to the multilevel reciprocity of stakeholder relationships (Freeman et al., 2018), the three featured cases may not reflect every possible AML rehabilitation project. Although adaptation through principles may be possible to adopt the findings for other ecological restoration cases, the study mainly targets further understanding of the AML niche. The limited numbers of cases may affect the ability to replicate and generalize the findings as case-specific uniqueness may be a considerable factor. As stated earlier, since the data providers were ones of the many stakeholders (project leader stakeholder) participating in the projects, the perspectives from the affected stakeholders may not be fully realized.

To achieve the utmost impartiality, the data from the individual data providers (DPs) as well as the documents (DOCs) from the organizations were included. Furthermore, the contexts of the data were evaluated to avoid factors such as language and dialectic differences before analysis was made from the generated amalgamated data pool (Eriksson & Kovalainen, 2008).

As stakeholder study is a multifaceted and transdisciplinary discipline, the aspect of stakeholder engagement in AML rehabilitation projects researched in this Master's thesis has only covered a small portion of a significantly large subject. Further analysis could be conducted from different angles and scopes. A concentration on just the stakeholder engagement between the natural environment and other stakeholders could be a whole new potential area of focus.

Another interesting point of view may be a separate look into AML rehabilitations conducted by governmental agencies and those conducted by private entities. However, during the data collection process, requesting data from large private corporations that engaged in AML rehabilitation projects were deemed extremely challenging.

Nevertheless, there are certainly many intriguing aspects of the study that remain in stakeholder engagement in ecological restoration specifically abandoned mines restorations.

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Appendices

Appendix 1: Interview Questions for the managers

1. What is your current job and how long have you been working in this organization?
2. What is the role of your organization or department in these rehabilitation projects?
3. Please give me a quick overview of the *[name]* abandoned mine site rehabilitation project. What was the problem? Why was the site picked for rehabilitation? When did the project take place? What were the main goals of the project?
4. How were the mentioned projects funded? Was there any source of subsidizing for these sorts of rehabilitation projects?
5. Which stakeholders were involved in the projects? How and why?
6. Was there any designated mediator (middle man) between the participants?
7. What factors directly influenced the success of the projects?
8. Were there any conflicts that needed resolving during the projects? If so, how were the compromises achieved?
9. How did the different parties communicate and collaborate during the projects?
10. Please give as many concrete examples as possible of the most important issues that happened during the projects.
11. From the aspects of laws and regulation, what are the distinctive differences between the governmental legislation on ecological restoration in South Africa and other places (e.g. Europe, etc.)
12. What have you or your organization learned from these projects? What kind of plans you have (regarding similar projects) in the future?

Appendix 2: Utilized Documents

Cases	Documents' titles	Date	Date of retrieval	Label
Black Diamond	➤ Case Study: Derelict Mine WA	Dec 2016	12/3/2019	DOC1
	➤ Black Diamond Update	May 2016	12/3/2019	DOC2
	➤ Improving Community: Safety at the Black Diamond Pit Lake	Feb 2016	12/3/2019	DOC3
	➤ Black Diamond Update 2	May 2016	12/3/2019	DOC4
Rooikraal Tailing Facility	➤ RTF One-pager	n.d.	15/5/2019	DOC5
	➤ Case Study	n.d.	15/5/2019	DOC6
Bunker Hill	➤ Bunker Hill Mining and Metallurgical Complex, Idaho, Superfund Case Study	Jan 2015	10/4/2019	DOC7